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Castings Mark Elevation Above Sea Level

BEFORE constructing a building, railroad, street, sewer, etc. it is necessary to know how much and where the land surface varies from being a plane surface. Many, no

The Cast Bronze Insert

doubt, have been surprised to find that house lots which apparently appear level are several feet lower at one end than the other. Consequently, if elevations were determined only from the ground, the house or building would slope accordingly. Usually, it is not difficult to establish working levels for small homes and buildings, but in the case of larger buildings, streets, sewers, railroads, etc. it is necessary to work from precise levels which are established according to their height above sea level. Such

The Stone Marker Contains A Bronze Insert in Its Upper Surface

levels are called bench marks, and they have been established accurately by the U. S. coast and geodetic survey. Since bench marks are permanent landmarks that must be as unchanging as possible, it is not surprising that castings are used in their construction. The accompanying illustrations reproduced through the courtesy of the Copper & Brass Research association, shows the concrete block, and the cast bronze button which is set in the upper surface of the block.

Find Where Castings Can Be Sold

CONTENTS

FEATURE ARTICLES

	Page
Molding Plumbing Goods—By Edwin Bremer	10
Merge for Sales and Sell More Castings—By Walther Buchen	14
Steel Founders Stress Need for Co-operation	17
Develop System for Price Setting—By LeRoy M. Sherwin	18
Causes and Prevention of Pinholes in Aluminum Castings—By D. Hanson and I. G. Slater	21
Relay Iron Pipe 75 Years Old	24
Philadelphia Prepares Welcome for A.F.A.	26
Prevent Losses with Proper Gates and Risers—By Pat Dwyer	27
Bill Notes Changes in Foundry Methods—By Pat Dwyer	34

REGULAR DEPARTMENTS

Readers Comment	25	**The Shakeout**	36
Questions and Answers on Foundry Practice	31	**Comings and Goings of Foundrymen**	37
Problems in Nonferrous Founding—By Charles Vickers	32	**Obituary**	38
The Foundry Family Photograph Album	33	**What the Foundries Are Doing**	42
		New Trade Publications	42

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Fig. 1—Sprues Must Be Kept Full of Metal During Pouring Operations

MOLDING PLUMBING GOODS

By Edwin Bremer

Ohio Foundry Specializes in Brass Castings for the Modern Bathroom

IN DAYS gone by, mere possession of a bath tub immediately stamped its owner as a person of opulence and standing in the community. Those who had the opportunity would come for miles to see what the new-fangled contraption looked like, and marvel at the tin tub encased in wood. Naturally, some of the hardier citizens scoffed at the idea of a bath tub, and proclaimed that bathing too often would weaken the physical constitution, cause mysterious illnesses, and eventually lead to the downfall of the country. They crowned their arguments by pointing out that the old Romans were a tough and hardy race until they built fancy bath tubs, and spent most of their waking time in those tubs.

Novelty Wears Off

However, the scoffers were decidedly in the minority as the tub idea continued to spread until it no longer was a novelty. The movement, of course, was slow in the early days as municipal water and sewage systems were slow to develop. Now, with the growth of those systems, practically every home possessed modern plumbing. Even in the country, with the development of individual water systems and sewage disposal tanks, it may be said that few homes are without modern plumbing. Any progressive farmer will state that he believes in modern plumbing as well as modern machinery.

It is a far cry from the tin bathtub era to the present day installations of porcelain and enameled cast iron tubs, lavatories and kitchen sinks. Those articles not only are made in the conventional white, but in almost every imaginable hue that strikes one's fancy. With the evolution to the present day design, the nonferrous fittings employed on the tubs, lavatories and sinks also received attention. Design of those fittings was changed to give more pleasing appearance, and their red color was covered with nickel or chromium plating to reduce as much as possible the difficulty of keeping the fittings shiny and bright.

In new building construction, replacement of wornout fittings, or modernizing the existing fittings, a large quantity of nonferrous alloys are consumed in the manufacture of such castings. Numerous foundries throughout the country are engaged in producing those castings which collectively are known as plumbing supplies. One of the various foundries is the Royal Brass Mfg. Co., Cleveland, which normally melts about 2½ tons of metal a day, or about 125,000 pounds per month since the capacities of nonferrous foundries usually are expressed in pounds per month or per year. The metal is melted in 8

pit-type, coke-fired furnaces, and 4 heats a day are obtained. The first heat requires about 2½ hours starting from the cold, but the remaining heats are taken off at 2-hour intervals. Careful attention is paid to the pits to keep the coke consumption as low as is possible without sacrificing furnace efficiency. Consequently, as soon as the walls show any tendency to *belly out* clay is applied to bring them back to the straight and narrow.

The alloy usually employed for fittings in the Royal foundry is that containing 85 per cent copper, 5 per cent tin; 5 per cent zinc, and 5 per cent lead, and is purchased in the ingot form. Other alloys including the nickel-silvers are used when occasion demands. A flux composed of approximately ½-pound each of plaster of paris and borax crystals is placed in each crucible after the metal melts down. A little crushed charcoal is placed on the ingots charged into the pot as a protection during melting. Just before removing the pot from the furnace, a small amount of phosphor-copper is added to deoxidize the melt which follows the usual practice employed in nonferrous foundries.

Operate the Furnaces

Operations and care of the furnaces is under the direction of a melter who is assisted by a helper. These men place, charge, and pull the pots, fire the furnace, and keep them in repair. Two other men aid the molder in carrying the molten metal to the floor where the molder and one of the men pour the metal while the other shifts the weights. Between pouring intervals the men clean castings, remove gates and risers, etc. A third man does the shaking out and reconditions the sand for re-use. Each time after the sand is tempered, it is riddled through a gyratory riddle manufactured by the Great Western Mfg. Co., Leavenworth, Kans. That operation breaks up any lumps and removes any tramp metals, and in addition aerates and cools the sand.

Molds are produced on six hand squeezer and two air-operated squeezer molding machines. While matchplates mainly are used, a number of gated patterns are employed with hard sand matches. Some of the work is cast solid and some is cored. As may be expected there is considerable variation between production of solid work and cored work. The average day's production of solid work is 120 molds while that on cored work ranges from 80 to 90 molds. In solid work the sprues usually are broken off while the castings are hot, unless the gate is heavy or it happens to be of such a nature that it might break into the casting. Sprues on cored work always are removed with a sprue cutter. The cores are blown out by immersing the castings as soon as they are shaken out in a tub of cold water. The castings are hot and when placed in the water create large volumes of steam which effectively disintegrate and remove the cores from the castings.

Fig. 3—About Two Hours Are Required to Melt a Pot of Metal

Use Many Small Cores

Cores used in the castings made by the Royal Brass Mfg. Co., as may be surmised, are small, but a considerable number are used each day. All cores are made on the bench and placed on iron plates for drying. The core room occupies one corner of the foundry, and the coremakers' benches are placed against the wall under the windows along that side. That arrangement results in good lighting conditions on the average, but it is supplemented by overhead lights equipped with reflectors for dark days, especially those in winter when darkness descends early. Core storage racks are opposite the benches and the gas-fired core oven. Coremakers average between 600 to 700 cores for a day's work. In making small castings profitably, it is necessary that all usable space in the flask be occupied with casting cavities. At the same time the

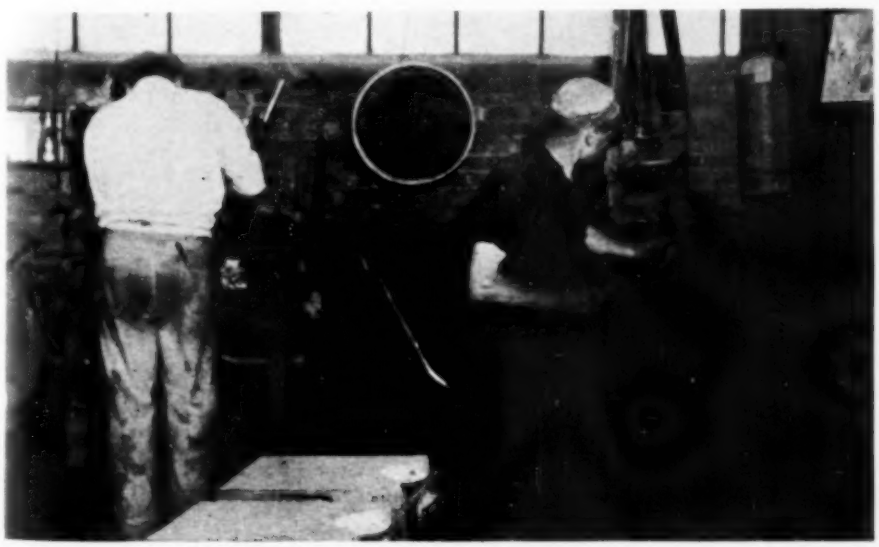


Fig. 2 — Molding Sand Is Screened Each Time Before Re-use on the Floor

cavities must not be too close together. If the latter is the case, trouble will be encountered from defective castings caused by the inability of the large volumes of steam created from escaping readily. One example of mold economy is shown in Fig. 10 which illustrates the cope and drag for compression or spindle nuts used on water faucets. The molds contain 42 cavities, and the patterns leave their own green sand cores.

Molds are made from a gate of castings which is placed in a hard sand match for making the drag. After the drag is filled with sand, a bottom board slightly smaller than the inside measurements is placed on it, and the whole rolled over. The hard sand match is removed, allowing the gate of patterns to remain without disturbance in the drag. Then the cope flask is placed over the pins of the drag, and filled with sand. A squeeze slightly smaller than the inside flask measurements, and containing two knobs on its under surface, is placed on top of the cope. The head of the machine is pulled into position and the molds squeezed simultaneously. The head is pushed back, and a small tube or sprue cutter forced through the sand at the impression left by the knob in the center of the mold. A rapping bar is inserted through the hole, given a few smart raps, and withdrawn. Then the hole is plugged with sand. The cope is lifted off, placed to one side on edge and inspected for defects. A tubular sprue cutter is pushed through the sand in the cope at the remaining impression left by the knobs on the squeezer board previously mentioned.

Then the gate of patterns is removed from the drag. That operation has to be conducted with extreme care as any side motion of the pattern before reaching the top of the draw will ruin the fragile green sand cores formed by the underside of the pattern. The central portion of the green sand core which forms the hole in the nut is slightly over ⅜-inch in diameter and projects about ¾-inch above the face of the drag. After examining the drag for defects, the cope is replaced, and then the two flasks are removed. The completed molds are lifted from the platen of the molding machine and placed on the pouring rails which are two 2 x 4-inch stringers on edge, elevated about 2 inches above the floor and spaced about 8 inches apart.

Fig. 6 shows two gates of castings; one containing four legs or feet for a

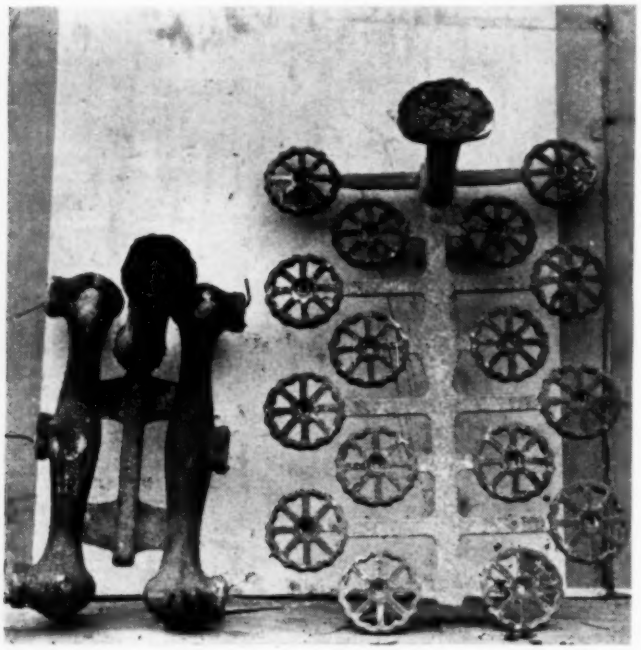


Fig. 4—Body Castings for a Kitchen Fixture and Valve Wheels Comprise the Two Gates

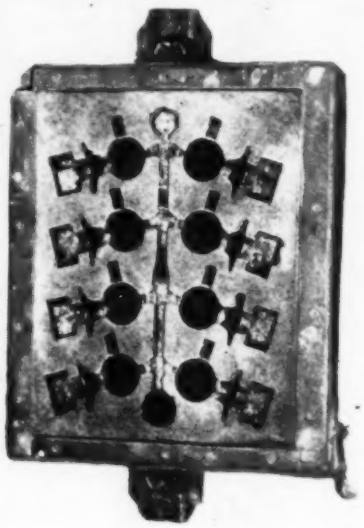


Fig. 7 — Cope Mold for Laboratory Fixtures

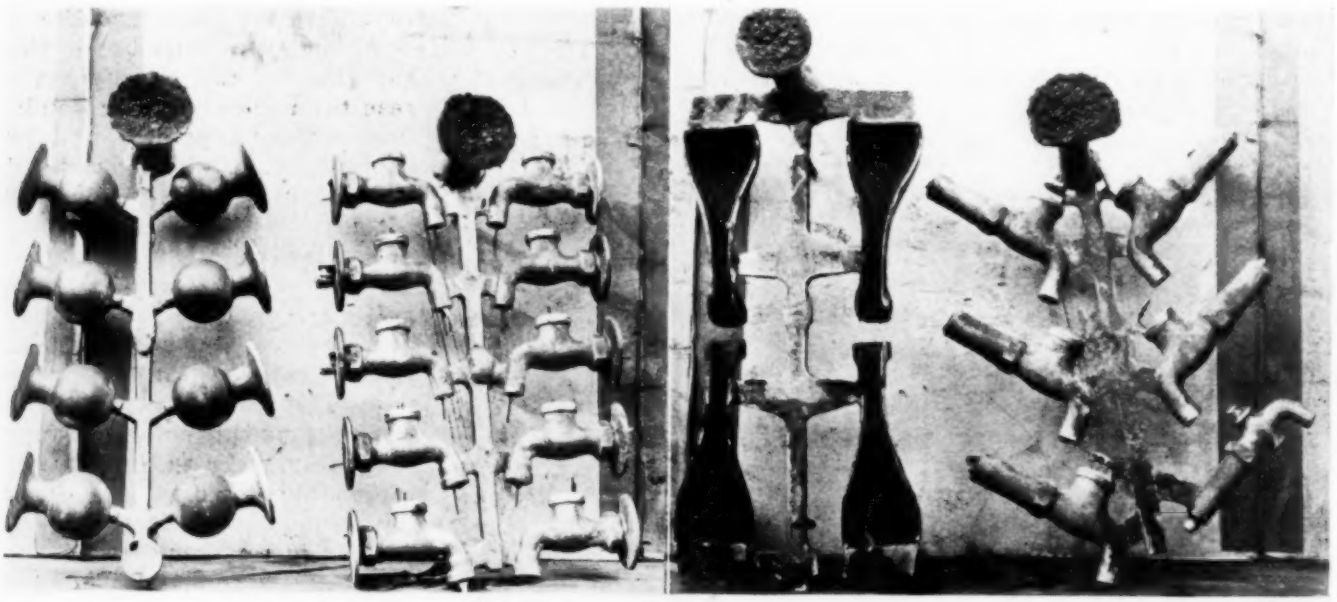


Fig. 5—Gates of Castings for Laboratory Fixtures and for Faucets. Fig. 6—Legs for a Coffee Urn and a Different Type of Faucet Are Shown

restaurant coffee urn, and the other six faucets. The leg castings are made from a gated pattern using a hard sand match while, the faucets are made from a matchplate. As may be observed the leg castings are gated at two points, and made with the exterior face, which later is polished and plated, in the drag. The gate of faucets shows two of the several methods of gating that type of castings. Five of the castings are gated at two points. One gate opens into the curved portion while the other opens into the slightly flanged top opening which later will be threaded to receive the spindle nut. The sixth casting is attached differently to the runner than the others, and has a single gate opening at the side near the end.

Gating Methods Vary

The cope mold of a special type of fixture used on chemical laboratory benches is shown in Fig. 7, and a gate of the castings is illustrated at the left in Fig. 5. The fixture contains two openings; one under the flanged portion, and the other in the spherical portion at a right angle to the first mentioned opening. The opening under the flange is for the supply pipe, and a gas or air cock is screwed into the side opening. The molds are made from a gate of patterns and hard sand match. Fig. 5 shows a group of faucet castings, also made from a gate of patterns and a hard sand match. The six castings nearest the sprue have plain nozzles while the remaining four are enlarged at the nozzle end which later will be threaded. Gating of the faucet castings shown in Fig. 5 is different from that in Fig. 6 as only a single gate is used, and it is attached just below the curved portion near the nozzle end. Another method of gating, which is not illustrated, employs two gates; one of which opens into the flange at the top, and the other into the nozzle almost at the end.

Fig. 8 shows the matchplate and drag mold for making four body castings for a combination hot and cold water fixture used extensively on modern kitchen sinks. The valve mechanisms are placed at the two ends while a movable nozzle is attached to the center opening. One sprue used for each pair of castings is attached to them by a short runner with two gates. A gate of castings shown in Fig. 4 includes a gate of valve wheels at the right. The latter illustrates mold economy through staggering the wheels to allow production of 16 instead of 8 for the size of flask involved.

Globe valves in the smaller sizes from ¼ to 2-inch pipe sizes are used considerably in plumbing layouts, and consequently the Royal Brass Mfg. Co. produces many of those castings in its foundry. The castinges, like many of the others previously described, must withstand pressure without leakage of any type, and as may be expected, care must be exerted in the process of manufacture. A gate of valve castings shown at the left in Fig. 9 shows clearly the method of gating. One gate is used for each casting and it is attached at the top flange. The gates, as may be noted, are fairly heavy. Attention also is directed to the attachment of the branch runners or gates to the main runner. The corners are rounded off carefully to eliminate fragile edges that might be broken off by the stream of molten metal, and that arrangement also reduces eddies or turbulence of the molten stream flowing into the casting cavity.

Fig. 9 in addition to the gate of valves includes a gate of stems at the right. It is made from a gated pattern and hard sand match on a hand squeezer molding machine. Stems are made in several different sizes in length and diameter for the various types of faucets made by the firm.

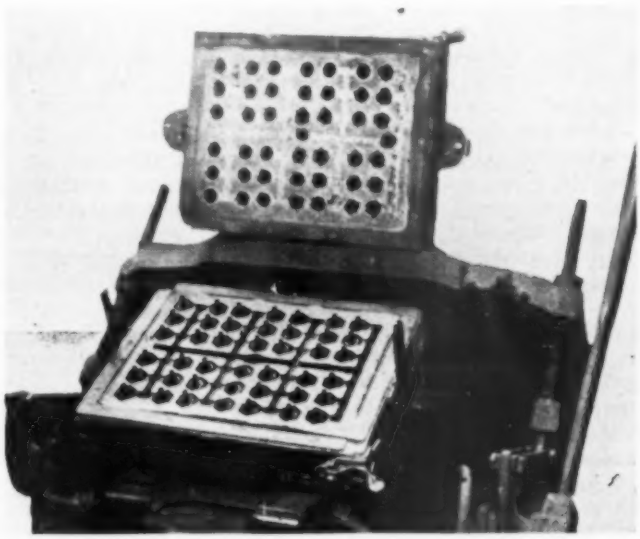
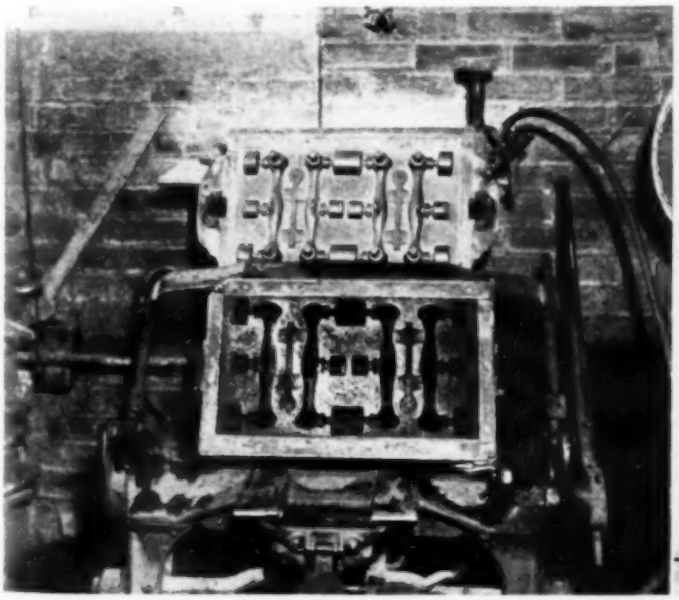


Fig. 10—Drag and Cope Molds for Faucet Compression Nuts. The Matchplate Leaves Its Own Green Sand Cores



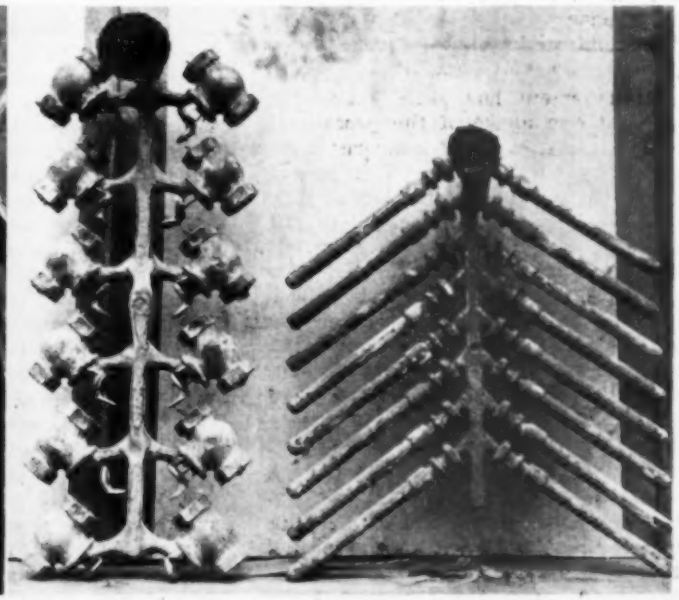


Fig. 8—Drag Mold and Matchplate for Making Kitchen Fixtures. Fig. 9—Gates of Castings for Globe Valve Bodies and Faucet Stems

Merge for Sales And Sell More Castings

By Walther Buchen

SINCE the beginning of 1930, such economic thinking as most of those in the metal parts industry have had time to do, has dealt with the economics of loss. As in other industries, first attempts to deal with it consisted primarily of diminishing outgo. At first, there was something approximating amazement at finding out how radically, sometimes quickly, expenses could be cut. The effects of this policy of diminishing outgo by cutting expenses were apparent so quickly, and were so relatively easy to effect, that for a considerable period the principal energies of many companies were concerned with that one phase of management.

Reaches Vanishing Point

As of January, 1932, most competently administered companies must admit that this policy has reached the point of vanishing return. There is not much more to be gained by eliminating personnel. There is not so very much more to be gained by reducing salaries. There is not so much more to be gained by reducing wages. There is not so much more to be gained by still cheaper materials. There is not so much more to be gained by chasing nickels in all miscellaneous sources of expense. These jobs have all been done and well done; in some cases perhaps too well done.

Management has come back with at least one phase of the prosperity era, namely, it must concern itself primarily with income. This is not intended to mean, of course, that this vital matter has been left out of mind for a space of 2 years. It has not; but all are turning to it with a greater intensity of purpose than perhaps has been exercised for the past 2 years. We realize now that we cannot work out of loss by saving alone. We must, of course, save ourselves out as much as we can—but we must also sell ourselves out, or else get out.

As soon as we do turn to increasing income as a means of keeping our industries alive, we, of course, turn to the volume of incoming business, and, therefore, to merchandising and prices. Merchandising is not selling. It is the discovery and utilization of everything that will make getting the order at an advantageous price more certain in a given case.

In the steel castings industry for the last 30 years, merchandising effort in the main has been concentrated on seven outstanding points. The first of these is the metal itself. Although it seems that steel castings were made on a commercial scale in this country as early as 1828, the industry did not enter on its present plans of activity until early in the present century. For a time the steel foundry could prosper by merely capitalizing the fact that its castings were of steel. In short, merchandising consisted largely of riding the trend toward steel. Today, this trend is a commonplace, and is becoming more and more difficult to capitalize for castings.

Walther Buchen

Probably the second factor in the active merchandising of the steel foundries' product was the steel foundries' inspection. About 1920 and 1921, there was an active and succesful effort on the part of a number of steel foundries to merchandise their inspection. They improved and strengthened inspection methods and personnel to such an extent that they could save the purchaser of steel castings a considerable amount of time, trouble and money, assuring delivery of a product smoother, more true to pattern and more certainly sound than had previously been the case.

For a time, that was an advantage in making sales at a more advantageous price. Later, the larger purchasers established their own inspection departments and refused longer to regard inspection service of the foundry as anything other than a matter of fact. To the smaller user, assured and competent inspection continued to be an advantage and to a large extent still continues to be so.

That phase is less important in competition between steel foundries than it was for a certain period of years because all foundries have made material advances in that phase of the art. Merchandising of inspection came to a point of diminishing return. Unless and until present pressure of lower prices relaxes inspection standards so that it may again become an advantage, a return to merchandising that feature is not as likely to benefit the steel castings industry as it is to help indirect competition such as welding.

Sell Foundry Practice

The third factor is foundry practice. As the market for steel castings increased and plants were enlarged and improved, more alert foundries began to make salable their knowledge of foundry practice. Through recommending better or more suitable pattern design and better or more economical heading and gating, they were able to reduce the cost of castings to themselves.

Presently, through pressure of circumstances, the foundries began to use that service to reduce prices to the purchaser. As soon as the effort reached that stage with many foundries, it became increasingly less important as a means of making sure of the order or of getting a better price. The buyer would avail himself of the service; would not feel under any obligation for it; would change his specifications in accordance with the advice of the initiating foundry; *and asks for new bids.*

In many cases the initiating found-

ry would get the first order, but after that the merchandising benefit of the service would have disappeared.

In general, although the merchandising of foundry practice has become more general and perhaps more intelligent than ever before, today it probably is netting the foundry less, both in certainty of making sales and in a better price, than it ever has done before.

The fourth stage of foundry merchandising is the merchandising of metallurgical knowledge and practice. This was already active before the advent of alloys on a commercial basis. Some merchandised metallurgical knowledge and practice by making a mystery of it, by featuring only the end result, that is, the values of the new metal to the purchasers.

Some who followed that line were exceedingly successful and others were not. Certain other foundries merchandised their metallurgical developments by giving the prospective purchaser full details of their analysis. Some of these also were quite successful while the volume of steel castings obtainable was considerable.

At present, neither school of merchandising metallurgical advancement seems to be in a favorable position. In the first place, the necessary paring of outgo because of diminished volume has diminished or quite stopped new metallurgical development. Secondly, the purchaser, because of his continued pressure on his own outgo, is more concerned with the low price and low cost direct to him, than with other advantages such as better machinability which is, of course, still a matter of direct cost to the purchaser of the steel casting. He is less critical than formerly, partly because of lower wage rates and partly because his own volumes are so much smaller that the saving per lot does not bulk large in his mind. That phase of the merchandising of steel castings also has reached a point of diminished return for some.

Give Engineering Service

The fifth factor in the merchandising effort of certain steel foundries has consisted of giving an engineering service in the design of the casting itself to permit more advantageous foundry handling or, quite often, to diminish the weight of the part. This again seems to be getting less emphasis. As in similar cases, the buyer avails himself of the design service, but frequently does not give a compensating advantage to the giver of the service. Another cause of the diminution is the smaller amount of new development and even the infrequency of redesigning parts.

A sixth factor has given the purchaser the benefit of the foundries' knowledge and development of heat treatment as a means of making cheaper steels take the place of more expensive alloys; sometimes, also, with a view to decreasing the cost of handling the castings in the purchaser's machine shops. Although that phase of the merchandising effort of the industry certainly has not run its course, the present small-volume conditions and frenzied pressure for lower prices, have for the time being, at least, put it in a position of diminished return.

The seventh phase is capitalizing knowledge of machine shop practice. Through dealing with a number of machine shops in connection with a great variety of castings some foundries have been able to develop men for giving valuable counsel to the prospective buyer about reducing machining costs by redesigning the casting, changing the heat treatment, or often by changing the setup in the machine shop itself. While not many detailed cases of this sort have been available, there are enough to show that the buyer took full advantage of this service without a compensating advantage under present conditions to the seller.

These seven factors in the merchandising of steel castings during the last decade or more have all reached a point of diminishing importance in the present price situation and are typical of others.

Costs can be grounded under seven major heads: Materials, labor, supervision, management, financial expense, fixed assets, and selling.

Material costs are lower than they have been during the days of most of the men now active in the industry.

Labor costs, taking into account not only present scales, but also labor-saving devices and methods, are probably lower than they have been for 15 years. Supervision costs are low in many cases.

Financial costs are for some less than they have been. More are working on their own money than was the case 10 and 15 year ago. For 2 years, although interest rates have been low, what money we have, had been increasing in value so much that even when it has been inactive we have, until now, had a high increment of value in it so that we have had a disguised financial profit. If we are working on borrowed money, the financing cost is, of course, high, *per unit produced*. If we have been anything but extremely careful of credits, our credit losses will also have been high.

Management Costs Lower

Management costs, in the main, probably are lower in bulk than for the last 9 or 10 years, and higher per ton of product. With fixed asset costs and selling costs there is little to fade out the unmitigated redness of the picture.

Depreciation and obsolescence are always present, a part of every cost. Selling a ton of castings without including at least such depreciation as the government allows, is giving as a gift with that ton of castings a part of the furnaces, machinery, and the plant.

Many are satisfied in a measure to get some depreciation in prices, reasoning, perhaps justifiably, that something is better than nothing and also that the plants and machinery, because they are being used less than before, should not bear a straight line rate based on time, but can well be charged only with a straight line rate based on the amount of production.

With obsolescence the case is far worse. Obsolescence is, in a large measure, a function of time and not of use. All of the time, even during this depression; and perhaps even more actively in depression than the years immediately preceding it, other ways of producing ferrous metal products are being developed and used. Welding is, of course, the most noticeable example.

In a period of deflation, that is, in a period of diminished volume, even the lowest volume traceable to other processes becomes an important factor in the obsolescence of the steel foundry, unless some measures are taken by these foundries to counteract or nullify the effect upon their plants. Yet in a period of depression, it is nearly impossible

A Co-operative

WHEN the Steel Founders society held its annual meeting in Chicago last month, Walter Buchen, the Buchen Co., Chicago, expressed forcibly his belief that the time has come for the steel casting industry to turn its attention from the cutting of expenses to the securing of additional income through the sale of its product. The industry must save itself out as much as it can, but it also must sell itself out, or else get out.

Integration of the steel foundry with other metal plants, especially in selling and merchandising, is recommended as one move that the steel foundry may undertake to strengthen its position with respect to sales. Such a sales merger would provide a co-operatively owned sales organization to handle the products of metal parts producers.

Advantages which might result from such a move, which by the way has been worked out successfully in other commercial lines, are outlined in this article; an abstract of Mr. Buchen's paper.

to obtain a proper obsolescence charge in the price of the product. As far as obsolescence is concerned, there is, therefore, at present no mitigating factor whatever in volume or in price.

As to selling costs, these also are lower today in bulk in most cases than for the last 5 or 6 years. Even in the cases of foundries that actively merchandise the services previously enumerated, the costs are less. Per unit or product they are, of course, high, perhaps higher than at any other time in the last 8 or 9 years. Because of the competent attention that already has been paid to outgo, it is not likely that continued action along the present lines of cutting expense can lower these costs materially. They are already in many cases too low for effectiveness. By proper use of advertising and similar aids, undoubtedly they can be cut in a number of cases, especially as far as marginal customers are concerned, and in some cases in the case of primary customers. This reduction, although possible and welcome, is not so material that it is any more important than the many other ways that still exist of somewhat further reducing costs.

Prices Not Reduced

This brief review of the present status of the factors in cost can only be discouraging. In a number of industries where this same situation obtains, prices seem to have been maintained in 1931. Individuals in these industries have been in a position to act, and have acted, on the basis that, in a period of deflation, there is no adequate increase in volume to be obtained from any advisable reduction in price. The steel casting industry has not been in a position to act on such a thesis. Unlike the few industries referred to, the principal concern of the steel castings industry is not so much about its direct competition, that is, the various steel castings organization, as it is about the indirect competition.

Largely because of that indirect competition, also partly because in a period of deflation self control is difficult, prices for steel castings in many cases have been dictated by what the individual producer thought would get the order. As in all other cases where the producer becomes almost entirely concerned with diminishing loss, or keeping loss at a minimum, loss increased rather than diminished. Price-cutting below profit levels is like deflation. It never can be controlled.

It is unfair to assume that its price status is due to the indirect competition of the industry, and to lack of judgment on the part of the member industry itself. It is perhaps due still more to the dominance of the buyer in the present situation. In every situation, sellers are many and the buyer is one. Sellers are divided against themselves. The buyer is single and unified. Sellers are puzzled about what they can get. The buyer knows perfectly what he wants. Competition has stabilized quality. Inspection methods have guaranteed it. If things are not as represented, the seller must make good.

Occasionally among thoughtful buyers and sellers, one hears some talk of a sellers' strike. What would happen if all of the sellers ceased to sell? Selling is not just offering a price and presenting an order blank, if the price is accepted. It consists largely of supplying valuable information about the product, about its suitability for certain purposes, and about its application to certain conditions.

Would Need Organization

If the seller went on a strike and ceased to sell, the buyer would have to have an organization to supply that information. To get the same values, he would have to have competent men from every class of vendors now supplying him. For the metal parts industry alone, this would require a formidable department, representing a high factor in overhead.

The experts would have too much traveling to do to keep informed, and perhaps they would find it difficult to get the same information that the vendor now gets. It is not conceivable that the buyer could perform that part of the selling function at anywhere near the cost, at anywhere near the flexibility, at which the vendors are now performing it. Yet that is what the buyer would have to do if all of the sellers retired to their plants and said: "Here I am —come and buy. I will give you my price for your specifications, and if you give me the order, I will supply them."

If they did that, there is little doubt that they could enforce better conditions. Of course, they won't. In the first place, they will not do it, because the sellers are also buyers, doing the same things to their vendors that their customers do to them. Secondly, they will not do it because they have neither the position nor the stamina to unite.

One also hears talk occasionally of ceasing to merchandise services—of sitting back and letting someone else supply the service and quote a price when new bids are asked. Some are already doing this. It is not observable that they are appreciably better off than those who are merchandising services. It is said that it has recently been done in another phase of the steel industry, but the steel castings industry as a whole cannot succeed in that way. If it ceases to provide and merchandise its service, the other metal parts industries certainly will not cease, and by virtue of that fact, will be in a stronger position to displace the steel castings industry. If *all* of the metal parts industries including die casters and manufacturers of welding machines, would join such a movement, there might be some hope of success, but they certainly won't.

What can the steel castings industry do. There are only three general policies possible for it.

The first is to let dog eat dog, and let the devil take the hindmost; the policy that in the main many factors in most industries are now pursuing.

The second is to take such ameliorating steps as are legal and suitable, and by establishing the framework of a more sensible competition to do the best that can be done in improving the product and its merchandising insofar as these will help, obtain a better price against indirect competition. The third is for such steel castings plants as are in a position to do it, to integrate with other metal parts plants, *especially in selling and merchandising.*

Form Common Organization

It is not impossible for a steel castings foundry, a modern gray iron foundry, a forgings plant, and perhaps even a die casting plant, to have a common sales organization owned by all of them. It is true that there are at present few men who successfully could sell and merchandise all four classes of products. Because the men do not exist at present is no reason for supposing that they cannot be developed. Probably another phase of the same kind of integration would be for a steel foundry to set itself up to supply welded parts.

Certainly, the steel foundry is in a better position to develop a technique for combining castings and other forms of steel, by welding, or even for welding noncast parts, than many another industry. It has for years been accustomed to the specifications surrounding such parts, and to their use in the buyer's plant. Such an extension is logical at this time. The small volumes at present obtaining make it inadvisable for many, to whom the welded part appeals, to buy the equipment and install a department for going ahead with this method of manufacture.

Perhaps still more to the point is the integration of selling. It cannot be emphasized too much that the primary cost in selling is the making and maintaining of the proper contacts. The creation and maintenance of these contacts can only be paid for by selling them something. The days in which one-product specialist could sell enough of his only product to pay for the contacts are, for the time being, gone. The only feasible remedy is for the specialist to enlarge his specialization by selling allied products for the same assembly, to the same contacts in the same organization.

STEEL FOUNDERS
Stress Need for Co-operation

NOT much more is to be gained by reducing personnel, salaries and wages. The job of chasing nickels in unnecessary expense has been completed. Management now must concern itself with income, according to Walther Buchen, the Buchen Co., Chicago, addressing

Arthur Simonson

the anunal meeting of the Steel Founders Society of America, at the Hotel Stevens, Chicago, on Jan. 21.

The period of saving ourselves out of the depression has passed and unless industry can sell itself out, it must get out. Reviewing the seven stages of steel casting selling, Mr. Buchen enumerated the metal quality, foundry inspection, foundry practice improvement, metallurgical advance, free engineering service in casting design, special heat treatment and capitalizing knowledge of machine shop practice and customer needs.

The age old injunction, "Let the buyer beware" has been turned about and now it is, "Let the seller beware." The speaker recommended selling mergers, on the basis that specialization on a single line is possible only in a large volume era. Today, he believes, steel castings could be sold in joint selling arrangement by men competent to handle many other products having similar customer outlet. Mr. Buchen's paper is presented in abstract on page 14 of this issue of THE FOUNDRY.

President W. H. Worrilow, Lebanon Steel Foundry, Lebanon, Pa., outlined the points upon which trade association co-operation is vitally needed and urged increased support of the society's objectives, in calling the meeting to order. Arthur Simonson, Falk Corp., Milwaukee, reviewed the subject of firm bidding, first presented to the membership in a paper at the meeting on Sept. 17, 1931. This principle, which is the submission of a price, accurately determined with reference to cost, to remain unchanged unless a change in buyers specifications warrants a different quotation, has been discussed widely. Definite action in approving of the principle was deferred to the meeting of the society to be held in Philadelphia, simultaneously with the American Foundrymen's association meeting.

Discourage Unfair Tactics

Clarence Tolan Jr., Dodge Steel Co., Philadelphia, commenting on Mr. Simonson's address, and on various practices extant, referred to the destructive deflation. He recommended that members discourage their own purchasing departments from tactics which meet every price quotation with a demand for a lower figure. Dire results have followed that general practice.

Trade reports by members present indicated an extremely low rate of operation governing the entire industry. Many expressed perplexity at the spasmodic character of inquiries, a few noted an increase in inquiries, several recounted instances of definitely deferred buying, mainly in railway lines and an attendant backed up demand.

In presenting his annual report, Granville P. Rogers, managing director of the society, outlined economies that have been established. He deprecated the destructive and unethical competition which has attended the depression period and stated that a wide review of suggested plans for reconstruction all tend toward trade association co-operative action. An address by Clark McKercher, counsel for the society, closed the session.

J. G. Ritter, Westinghouse Electric & Mfg. Co., Pittsburgh, defined the determining factor in the comparative cost of welded and formed or castings for similar work, to be the number of pieces involved. In other words, the pattern cost is the important item in work of the character manufactured by the speaker's company. He discounted the inference that his firm was interested in promoting welding in preference to castings, due to the fact that the company manufactures welding equipment, and stated that the savings in cost in each individual item was paramount in cases of competition. Slides were shown depicting examples

G. P. Rogers

of work made by a combination of structural material and castings, in many instances joined by welding.

The following officers were elected for the ensuing year: President, Arthur Simonson, Falk Corp., Milwaukee; vice president, Eastern division, G. R. Casey, Treadwell Engineering Co., Easton, Pa.; vice president, Central Atlantic division, John E. Galvin, Ohio Steel Foundry Co., Lima, O.; vice president, Midwest Southern division, F. A. Lorenz Jr., American Steel Foundries, Chic go; and vice president, Mid-Continent division, H. G. Muchnic, Locomotive Finished Material Co., Atchison, Kans. The following new directors were elected: W. H. Worrilow, Lebanon Steel Foundry, Lebanon, Pa.; W. W. Powell, Mesta Machine Co., Pittsburgh; J. T. Osler, Hubbard Steel Foundry division, Continental Roll & Steel Foundry Co., E. Chicago, Ind.; R. F. Nash, Pettibone-Mulliken Co., Chicago; and C. A. Binder, St. Louis Steel Casting Co., St. Louis; Burtner Fleeger, Oklahoma Steel Casting Co., Tulsa, Okla.

Develop System For Price Setting

By LeRoy M. Sherwin

DUE to the wide and extremely miscellaneous character of the castings made in the gray iron foundry of the Brown & Sharpe Mfg. Co., Providence, R. I., the task of developing a satisfactory price setting system presented quite a problem. Following the compilation of data based on a large number of time studies, certain factors including constants and variables were adopted. These factors apply to the four main divisions under which castings are made, namely: Squeezer machines, other molding machines, bench molding, floor molding.

Squeezer machines are provided with three different kinds of pattern equipment: Gated pattern on litharge match or follow board; gated pattern on litharge match or follow board with vibrator attachment; gated pattern on matchplate with vibrator attachment. The first requires time for rapping the pattern before lifting the cope and again before drawing the pattern, also time for making a joint and swabbing the joint. The second requires time for making a parting joint but no rapping or swabbing. The third requires no time for making the joint, rapping or swabbing.

Require Three Sets

Molds for the squeezer machines require three different sets of constants. The variables remain the same except the time for finishing a mold with the vibrator attachment and match plate. The pattern is drawn more accurately and the mold does not require so much finish. Also the match plate requires no time for making a joint.

Three different sets of each of the constants are applicable to different pattern equipments. Added time is allowed for fatigue on larger sizes of flasks, divided into three classes: Those up to 160 square inches, those between 161 and 200 square inches, and those over 200 square inches.

Squeezer machine work, nearly all alike regardless of shape of pattern (except as previously stated) is governed by the square inches of flask to get the constants. The time allowed for shoveling and ramming is governed by the cubic inches of sand in the flask and multiplied by a set variable, meaning the time required to shovel and ram 1 cubic inch of sand in the flask. This variable has three different amounts for squeezer work: Easy shovel and ram; hard shovel and ram; shovel sand and jolt.

The variable of joint has three different amounts of set time for squeezer work, easy, medium and hard. It is governed by the judgment of the man setting the rates and may be questioned by the foreman of the department, who may call for a time study of the particular job. The variable of draw pattern and finish has three different units of time, easy, medium and hard. On squeezer work this is a set amount. Nearly all work of that type requires about the same amount of finish.

The variable *blacking on squeezer* is alone. It is not used on a number of jobs so it is rated in four set of time amounts: none, dust, brush and rub.

A sheet is allotted to setting one or more nails; one for setting one or more gaggers, soldiers, or rods, and one for setting different grades of cores. These are used for all departments of the foundry.

The system for use on molding machine rates is approximately the same as for the squeezer on small work until the flasks go over 325 square inches in size. The fatigue is greater on iron and steel flasks and there are nearly always two rollovers, instead of one as on squeezers.

The time allowed for shovel and ram is greater. Therefore, the variable for multiplying the cubic contents of flask is larger. The set time for finish is larger and is divided into three grades: Easy, medium and hard. The blacking time also is a set time on small work on these machines. There are four grades, namely: None, easy, brush and rub.

Fatigue Is Greater

Over 325 square inches of flask area, the fatigue is greater and requires a larger constant and variable. A curve sheet for each kind of machine covers: One half on rollover and one half on plate; both halves on rollover, one half on rollover and one half on stripper, both halves on stripper, etc. A separate sheet of constants and variables also is used on different types of small molding machines.

Constants on large machine work are determined by the square inches of flask, except on certain jobs, which as cone pulleys or any very deep flask when the square inches of flask factor is found by multiplying the depth by the width. So far that method has been used only on cone pulleys.

The shovel and ram time is obtained by a set variable multiplied by the cubic inches in the flask with the cubic inches of pattern taken out. Four variables cover this item: Very easy (plate work, no gaggers), easy, hard and very hard.

Finish and blacking time is combined and is obtained by multiplying the square inches of pattern area, in-

Explains Method

A PRICE setting system has been built up from a mass of data obtained from a large number of time studies. Factors obtained from these data are made up of constants and variables. The constants have been reduced to the form of curve sheets or set figures which take care of all operations common to jobs made on certain squeezer machines, other type molding machines, on the bench and on the floor. The variable factors include: Shovel and ram sand, place pattern, place each loose pattern piece, loose upset, claywash or wet flask, extra vents, risers, fasten pattern to cope for lift, place nails, gaggers or rods, chills, cores, making parting joint, drawing pattern, finishing and blacking mold, rapping pattern before lifting cope, bolt and unbolt bottom plate, build runner box, skin drying wet blacking with torch, etc. The article is from a paper presented at the Chicago convention of the American Foundrymen's association. The author, L. M. Sherwin, is foundry and pattern shop superintendent Brown & Sharpe Mfg. Co., Providence, R. I.

cluding core prints and loose pieces, by a set variable. This variable has six ratings: Very easy, very easy particular, easy, easy particular, medium and hard.

Building runners and riser boxes, use of screw clamps, binders, wedges, etc., are taken care of in the miscellaneous sheet to be mentioned later under the head of floor work.

Find Bench Constants

In three part molds of all kinds except the bench, the set figure or figures received from curve sheet for constants is multiplied by 1.5. Also, the joint factor must be used two or three times or as many times as there are parts to the mold.

Four sheets of constants and variables shown in the accompanying tables cover molds made on the bench.

Table I is for circular patterns up to where the diameter squared is less than 80 inches. Over 80 inches it becomes what is called a full mold and is taken care of by the respective sheet according to size of pattern. Table II takes care of small patterns which do not require the whole flask. Table III is to take care of patterns which require whole flasks with less than 225 square inches of area. Table IV is for patterns which require part or all of a flask with over 225 square inches of area used on large jobs.

Table I lists the set time standards for constants of circular patterns in sizes 10 to 15, 16 to 20, 21 to 25, 26 to 32, 33 to 39, 40 to 49, 50 to 56, 57 to 64, 65 to72, and 73 to 79 square inches. The standards are controlled by the parting joint of their respective size of square inches. Each section of square inches has three different set time allowances or constants. Easy joint, medium joint, and hard joint.

These constants, like the constants of Table II, which will be explained later, carry the time allowance for placing the board and flask, striking off, placing boards on or off, venting, watering pattern, closing and fastening hooks, lifting off cope, cutting sprues and basins, making parting joint, and shovelling and ramming sand for their own respective part of the flask.

Split the Variables

Except when molds are to be made three-parted, Tables III or IV are used. Constants are split to whatever part of the mold the pattern is to carry, ¼, 1/3, ½, 2/3, ¾, etc. This operation also will split the variable for shovelling, ramming and making of parting joint.

Time allowance for finishing these molds is based on the square inches of pattern area multiplied by the variable per square inch in Tables III or IV. Any other time amounts required for cores, nails, spikes, etc., are taken from the sheets which cover these items for all departments.

Divided Into Sections

Table II is somewhat similar to Table I except that it takes care of the other small patterns. It is divided into sections with three different time allowances for each size of pattern each different size pattern is governed by its respective parting joint. Easy joint, medium joint, hard joint; ¼ pattern, 1/3 pattern, ½ pattern, 2/3 pattern, ¾ pattern. These pattern sizes are governed by a standard size flask 13 x 13 inches.

The finishing time allowance for any particular pattern is governed by its area, and carried through as explained for Table I.

Table III is used for all flasks on the bench less in area than 225 square inches. The constants cover placing and removing bottom board and follow board, striking off and rolling over, cutting sprues and basins, watering pattern and lifting cope, rapping patterns, putting sand on, venting closing mold, and setting on floor.

Shovelling and ramming is governed by the cubic inches in the flask multiplied by a set variable as in other forms of molding. Finishing allowance is the same as explained for

Table I

Bench Constants in Circular Patterns

Square Inches	Hours Joint	Square Inches	Hours Joint	Square Inches	Hours Joint
10		33		57	
11	E 0.0256	34		58	
12	M 0.0310	35	E 0.0512	59	E 0.0768
13	H 0.0366	36	M 0.0620	60	M 0.0930
14		37	H 0.0732	61	H 0.1098
15		38		62	
		39		63	
16				64	
17	E 0.0303	40			
18	M 0.0366	41		65	
19	H 0.0432	42		66	
20		43	E 0.0605	67	E 0.0805
		44	M 0.0732	68	M 0.0975
21		45	H 0.0865	69	H 0.1150
22	E 0.0341	46		70	
23	M 0.0413	47		71	
24	H 0.0488	48		72	
25		49			
				73	
26		50		74	
27		51		75	E 0.0905
28	E 0.0402	52	E 0.0682	76	M 0.1100
29	M 0.0488	53	M 0.0826	77	H 0.1295
30	H 0.0575	54	H 0.976	78	
31		55		79	
32		56		80	

E—Easy Joint.
M—Medium Joint
H—Hard Joint

Table II

Constants on Small Patterns

Small Patterns (Square Inches)	Constants	Hours
One Quarter Pattern (9-20)	Easy joint	0.303
	Medium joint	0.366
	Hard joint	0.0432
One Third Pattern (20-33)	Easy joint	0.0402
	Medium joint	0.0488
	Hard joint	0.0575
One Half Pattern (33-50)	Easy joint	0.0605
	Medium joint	0.0732
	Hard joint	0.0865
Two Thirds Pattern (50-67)	Easy joint	0.0805
	Medium joint	0.0975
	Hard joint	0.1150
Three Quarters Pattern (67-80)	Easy joint	0.0950
	Medium joint	0.1100
	Hard joint	0.1295
Very Small Extra Pattern	(0-2.5-inch)	0.0075
Small Extra Pattern	No cores	0.0165
	Cores—(2.5-inch-6-inch)	0.0206
	Horn sprue	0.0248
Large Extra Pattern	No cores	0.0241
	Cores—(6-9-inch)	0.0300
	Horn sprue	0.0346

Variables

Place horn sprue	0.0035
Place pattern (each piece)	0.0015
Fasten pattern to cope	0.0050

	Hours per square inch
Draw pattern, finish and blacken—Very easy	0.00010
Easy	0.00025
Medium	0.00040
Hard	0.00055

If greatest length times greatest width is less than 2¼ square inches consider as a very small extra pattern; between 2¼ and 9 square inches consider as small extra pattern; between 9 and 20 consider as a quarter pattern; between 20 and 33 consider as a third pattern; between 33 and 50 consider as a half pattern; between 50 and 67 consider as a two-thirds pattern; between 67 and 80 consider as a three-quarter pattern.

the circular and part patterns, the square inches of pattern area multiplied by a set variable. On three part work on the bench, an additional variable for the operation is called three part hooking. This is used instead of multiplying constants as in other parts of foundry work. Another joint is added according to the nature of the pattern.

Table IV on bench work, covers the time allowance on flasks used on the bench with over 225 square inches of area. This table is the same as Table III except that the time allowances are larger on the constants and variables to take care of the extra fatigue for heavier work.

Floor and crane work differ a little from other branches of molding. The time constants are obtained by the square inches of flask area and the nature of the parting joint.

Use Three Curves

Three curve sheets cover the constants for easy joint, medium joint and hard joint and one curve sheet deals with large flasks, 4000 square inches and over in area. This sheet has three curves: Easy, medium and hard joints, classed as *A*, *B* and *C*.

An easy joint means a split pattern or pattern with a flat surface on the cope side and the parting joint even with the joint of the flask. A medium joint is found on a pattern with a rounded edge or uneven parting joint such as the arms of a wheel, etc. On a hard joint the line is exceedingly uneven. Banks must be secured with spikes, etc., or wet parting sand has to be used to make a good parting.

Constants take care of the time allowance for making the joint, handling mold board and bottom board, all parts of flask, rolling over, parting sand, rapping and watering patterns, lifting off cope, and closing mold.

Determine Ramming Time

Shovelling and ramming time is derived by multiplying the cubic inches of sand in flask less the cubic inches of pattern by a set variable. Sand is rammed by hand, by the sand slinging machine and by bumper. By hand, there is a variable for easy and hard. By the sand slinging machine there are variables for easy, medium and hard. By bumper they are all alike and a good deal like the jolt ram.

Drawing pattern, finishing and blacking time allowances are obtained by multiplying the square inches of the area of the pattern (including core prints and loose pieces) by a set variable for each square inch. Four classes of finish are listed as: Very easy, easy, medium and hard. A special variable is used for drying wet blacking, also for drying and baking flour facing molds with torch or charcoal fires.

A sheet designated as miscellaneous takes care of crane floor items including screw clamps, small, medium and large; setting small blocks and binders for one or two chaplets; large by hand and large by crane, wedges, core supports, leveling mold or mold board, use of straight edge, rods or pipes for carrying off vents from cores, boxing of loose piece in green sand, making joint and using covering cores, and several others; easy, medium and hard.

Pouring and dumping are taken care of by time allowances of their own in the different departments of the foundry. All supplies, nails, blacking, cores, etc., are brought to the floor or bench of the workmen so that no time is lost.

A workman who feels that the time allowed for a certain job is not correct, notifies his foreman and he, in turn, takes the matter up with the time study man, who will check up on the job, and, if necessary, go to man's floor and take a time study of the job in question in the presence of the foreman.

Made Division Manager

M. I. Dorfan has been appointed manager, dust collector division, Blaw-Knox Co., Pittsburgh. Previously Mr. Dorfan was connected with the Pangborn Corp., Hagerstown, Md., and the Allis-Chalmers Mfg. Co., Milwaukee. The Blaw-Knox Co. recently has introduced two new lines of dust collecting equipment.

Table III

Constants On Bench Work

Flasks less than 15 x 15 inches. All time state in hours.

Constants		Hours
Place board and drag		0.0070
Strike off and board on		0.0050
Rollover and remove board		0.0040
Set cope on		0.0027
Strike off		0.0028
Cut sprues and basins		0.0134
Lift off cope		0.0056
Water patterns		0.0061
Close and fasten hooks		0.0081
Set on floor		0.0035
Vent		0.0118
Total constants		0.0700..
Variables		
Place pattern each piece		0.0020
Place upset		0.0015
Face pattern shovel and ram,	Easy.....per cu. in. of flask	0.000025
	Hard .....per cu. in. of flask	0.00003
	Very hard..per cu. in. of flask	0.000035
Clay wash on cope		.0050
Extra vent		0.0085
Riser		0.0093
Fasten pattern to cope		0.0050
Make joint	Very easy....	0.0075
	Easy	0.0175
	Medium	0.0300
	Hard	0.0600
	Very hard..	0.0900
Set gaggers or soldiers		see gagger sheet
Set nails		see nail sheet
Set cores or chills		see core sheet
Draw pattern, finish and blacken, very easy, per sq. in. of pattern		0.00012
	Easy, per sq. in. of. pattern	0.00025
	Medium, per sq. in. of. pattern	0.00040
	Hard, per sq. in. of pattern....	0.00055
Place and lift off false cope		0.0084
Extra hooking, cut gates in cheek, place, lift off cheek and replace (3 part mold)		0.0282

For very difficult jobs with only one or two pieces on the order increase time 50 per cent. For slightly difficult jobs with only one or two pieces on the order increase time 25 per cent.

Table IV

Constants on Large Bench Jobs

Flasks 15 x 15 inches or over.

Constants		Hours
Place board and drag		0.0119
Strike off and board on		0.0061
Rollover and remove board		0.0072
Set cope on		0.0090
Strike off		0.0036
Cut sprues and basins		0.0180
Lift off cope		0.0090
Water patterns		0.0107
Close and fasten hooks		0.0142
Set on floor		0.0061
Vent		0.0180
Total constants		0.1138
Variables.		
Place patterns each		0.0040
Place upset		0.0015
Face, pattern, shovel and ram—	Easy, per cu. in. of flask.....	0.00002
	Hard, per cu. in. of flask....	0.00003
Clay wash on cope		0.0070
Extra vent		0.0085
Riser		0.0093
Fasten pattern to cope		0.0075
Make joint	Easy.....	0.0090
	Medium	0.0360
	Hard	0.0900
	Very hard.....	0.1200
Set gaggers or solders		see gagger sheet
Set nails		see nail sheet
Set cores or chills		see core sheet
		Hours per sq. inch of pattern
Draw pattern, finish and blacken, very		
	Easy	0.00010
	Easy	0.00025
	Medium	0.00040
	Hard	0.00055
		Hours
Place and lift off false cope		0.0120
Bed pattern in (hard joint—no match)		0.0500
Extra hooking, cut gates in cheek, place, lift off cheek and replace (3 part molds)		0.0366

For very difficult jobs with only one or two pieces on the order increase time 50 per cent. For slightly difficult jobs with only one or two pieces on the order increase time 25 per cent.

Causes and Prevention of Pinholes in Aluminum Castings

By D. Hanson and I. G. Slater

TREATMENT of aluminum and its alloys with chlorine followed by nitrogen appears to give somewhat uncertain results. A mixture in equal proportions of the two gases is effective and consistent. Further experiments were made involving the gas-treatment of aluminium alloy melts using larger quantities of metal under works conditions.

A large stock of 3L11 (8 per cent copper) alloy of identical composition was prepared from virgin aluminium ingot and a 50:50 per cent temper alloy by melting in an oil-fired iron pot furnace and casting 7-pound ingots into chill iron molds. The temper alloy was melted in an oil-fired crucible furnace from electrolytic copper and virgin aluminium ingot, the latter quality of ingot being used also for the final melt, 60 pounds of this stock 3L11 alloy were taken for each test, an oil-fired furnace and a new plumbago crucible being used.

Melt Metal Rapidly

Starting from cold, about 45 minutes' heating was required to melt the charge and bring the temperature up to 700 degrees Cent. (1292 degrees Fahr). Chlorine and nitrogen were obtained from cylinders, the nitrogen being dried by bubbling through concentrated sulphuric acid contained in two large Dreschel washbottles and a single large Woulf's bottle, another similar Woulf s bottle being used for chlorine.

The gases were introduced into the melt via an iron pipe of ½-inch internal diameter, on the end of which was affixed an inverted 3-inch plumbago crucible drilled near to the open end with eight ¼-inch diameter holes. The flow of gas was adjusted to about 15 to 20 bubbles per second—a fairly rapid rate—and bubbled into the bottom of the 12-inch depth of metal contained in the crucible. During treatment the furnace burners were turned off.

The following test-pieces were cast from each treated melt: Standard taper block in (a) Skin-dried green-sand (*S*), (b) Stove-dried sand (*D*); Luvax (a disk 5-inch diameter x ½-inch with central boss 2-inch diameter x 2 inches) casting in (a) Skin-dried green sand (*S*), (b) Stove-dried sand (*D*) and two tensile test-bars in stove-dried sand molds. The inclusion of stove-dried molds in these tests is explained later. A number of treatments were carried out and they are listed in Table VII.

Results Differ

AFTER laboratory experiments with 3-pound lots, the work was carried on using 60 and 200-pound lots under commercial or plant conditions. Using nitrogen and chlorine together, the results with the 60-pound melts agreed with those obtained with the 3-pound melts. However, in the 200-pound melts, treatment with the gases was not so successful, and reasons for that condition are mentioned in this article which is abstracted from a paper presented by the authors at the September, 1931, meeting of the Institute of Metals.

Much trouble was experienced with the gas lead-in pipe, which became blocked with chlorides in a few minutes, often burning right through. For experiments of longer duration, two or three new pipes were required for one treatment. No inconvenience was caused by the escape of chlorine into the atmosphere from the melt being treated; that which was not absorbed by the metal being effectively taken up by the flues. Evolution of gas on solidification of the castings was observed only with the taper blocks from the untreated metal.

The density of each of the castings was determined, and the results are given in Table VII. The tensile test-bars then were machined to 0.564-inch diameter and broken. Sections were made of the taper blocks in the usual manner, and the Luvax casting was sectioned through the center after preparing the bottom face.

It should be observed that, during treatment, the heating burners were turned off. No contamination of the melt by furnace fuels or products of combustion occurred subsequent to the commencement of the treatment, except in the case of No. 7, which was reheated for 10 minutes to bring the temperature to 720 degrees Cent. (1328 degrees Fahr.).

The result of these treatments agree well with the laboratory experiments using the 3-pound melts. Density determinations made on the castings (taper block, Luvax castings, and tensile test-piece) show excellent agreement with the visual appearance of the prepared sections.

Improvement Is Moderate

Nitrogen is found to effect moderate improvement. Chlorine at 700 degrees Cent. (1292 degrees Fahr.) gives but little improvement. Treatment at 660 degrees Cent. (1220 degrees Fahr.) with this gas proves much more satisfactory. The low densities recorded for the No. 6 castings are due to the presence of casting unsoundness and misruns caused by the low pouring temperature.

On heating this melt to a casting temperature of 720 degrees Cent. (1328 degrees Fahr.), some gas is absorbed from the furnace atmosphere, as is shown by the appearance of further pinholes in the castings. However the castings are still fairly good. A treatment with chlorine followed by nitrogen is relatively ineffective. Castings practically free from pinholes are obtained from the melts treated with a mixture of chlorine and nitrogen. The addition 0.1 per cent sodium to the gas-free melt results in a deterioration. Grain size is reduced, but pinholes and cavities of larger dimensions have appeared.

Tensile tests made on the nine treated melts show that none of the treatments has a deleterious effect on the tensile properties of the alloys. With the pinhole-free metal (No. 8) a slightly higher elongation and an increase in tensile strength of 20 per cent are observed.

Melts used in the treatment of 200 to 300-pound melts were taken from those used in production, and the procedure adopted, other than the experimental treatment, was that of the normal foundry routine. Three iron-pot tilting furnaces of similar

Table VI

Treatment with Cadmium Additions

Ingot No.	Material	Treatment—Addition of	Density	Appearance
66	M. "3L11"	1 per cent cadmium	2.841	Moderate
67	M. "3L11"	0.1 per cent cadmium	2.820	Moderate
70	M. "3L11"	0.5 per cent cadmium	2.833	Moderate

design heated with city gas were used. The charges were made up from the requisite quantities of virgin ingot, 50:50 per cent (copper—aluminum) temper alloy, and spelter. Both the 2L5 (2.75 copper and 13.5 zinc) and the 3L11 (8 copper) alloy were melted in 200 to 300-pound charges, treated, and the treated metal was used for castings and production, as well as for test-blocks. The test-blocks were the standard ones used regularly in the foundry for the observation of pinholes.

They were cylindrical blocks 3 inches in diameter and 3 inches high, cast with an open top in a stove-dried sand mold. These test-blocks were prepared for visual examination of pinholes by turning off ½-inch of metal from the base of each, the cross section so obtained then being polished and etched. This method is alternative to the vertical sectioning of the block, and it has been found to yield satisfactory comparative results.

Build Gas Apparatus

The gas-treatment apparatus was specially made up for works practice. It was built in one compact unit with cylinders of chlorine and nitrogen, delivering gas to a final mixing bottle and thence to a length of rubber hose. The nitrogen was dried by passage through two large calcium chloride towers arranged in series. The mixed gases were introduced into the melt by a large iron pipe lined externally with asbestos string coated in lime wash, and internally with alundum tubes of 1.25-inch internal diameter. In spite of these precautions, the life of the lead-in tube was never more than 2 hours due to the combined attack of chlorine gas and molten aluminum. A stainless nickel-chromium steel tube of 1-inch internal diameter was also tried, but failed after about 20 minutes' service.

Treatments were made in each experiment with a mixture in approximately equal proportions of nitrogen and chlorine. Gas treatment of the melt was commenced as soon as the charge had melted down at about 630 degrees Cent. (1164 degrees Fahr.), and continued during heating to the furnace pouring temperature of 760 degrees Cent. (1400 degrees Fahr.)—with certain exceptions, as described later. The usual vigorous reaction occurred during treatment, and fume was evolved in some quantity toward the end of the treatment as the temperature approached 760 degrees Cent. (1400 degrees Fahr.). Dross in larger quantity than usual was formed, the nature of which was similar to that reported upon in the laboratory experiments.

Test-blocks were taken from the melt at the finishing temperature of 760 degrees Cent. (1400 degrees Fahr.) and allowed to cool to 700 degrees Cent. (1292 degrees Fahr.) in the hand ladle before casting. In experiments 8, 9, and 14 treatment was commenced with the heating gas turned off and blocks cast prior to continuing the treatment as the temperature rose to 760 degrees Cent. (1400 degrees Fahr.). Details of the melts treated are given in Table VIII.

Density determination figures must be accepted with some degree of caution, since they will vary from charge to charge due to unavoidable slight variations in weighing out the original charge and hence in composition. The extremes found in blocks cast from various untreated melts of the same alloy were in the case of 2L5 alloy, 2.917 to 2.924, and in the case of the 3L11 alloy, 2.810 to 2.828.

Not So Successful

Treatment of the 200 to 300-pound melts has proved to be not so successful as with the 60-pound and the 3-pound experimental melts. The 2L5 alloy appears to be more amenable to treatment than the 3L11 alloy. In those treatments where the temperature has not risen above about 700 degrees Cent. (1292 degrees Fahr.), for example 14 *B* and *C*, 8*A* and *B*, 9*A*, treatment has resulted in the production of a casting nearly free from pinholes with the 2L5 alloy, but has not been quite so

Table VII

60-Pound Experimental Melts

Specimen Number and Treatment	Density: Taper Block	Density: Luvax Casting	Density: Tensile Test-Piece	Tensile Tests: Yield-Point lb./sq.in.	Tensile Tests: Ultimate Strength lb./sq. in.	Tensile Tests: Elongation on 2 in.
1S—Stock "3L11" ingots remelted	2.801	2.828	2.831	13,440	18,458	2.5
1D and cast without treatment	2.800	2.827	2.830	12,992	18,637	2.5
2S—Dry nitrogen bubbled into	2.824	2.835	2.842	10,572	17,114	2.0
2D melt at 730-750 degrees Cent. for 10 minutes.	2.813	2.834	2.836	12,634	18,995	2.5
3S—Dry chlorine bubbled into	2.805	2.836	2.841	12,902	18,726	2.5
3D melt at 730-150 degrees Cent. for 10 minutes.	2.806	2.831	2.836	13,440	19,085	2.0
4S—Mixture in equal proportions	2.821	2.844	2.846	13,440	18,010	1.5
4D of dry nitrogen and chlorine bubbled into melt at 730-750 degrees Cent. for 10 minutes.	2.818	2.852	2.849	12,902	19,085	2.5
5S—Dry chlorine bubbled into	2.794	2.825	2.837	13,888	17,741	2.5
5D melt for 10 minutes, followed by dry nitrogen for 5 minutes. Melt at 730-750 degrees Cent.	2.815	2.828	2.840	9,856	17,920	2.5
6S—Dry chlorine bubbled into	2.800*	2.828*	2.859*	11,917*	12,992*	1.0*
6D melt at 660-670 degrees Cent. for 20 minutes.	2.819*	2.830*	2.839*	11,917*	14,067*	1.0*
7S—Remainder of metal from No.	2.828	2.852	2.854	11,827	19,981	2.0
7D 6. Treatment: Heated up to 720 degrees Cent. for 10 minutes.	2.822	2.834	2.854	13,171	18,144	2.0
8S—Mixture in equal proportions	2.838	2.859	2.864	15,232	22,938	3.0
8D of chlorine and nitrogen (dry) bubbled into metal at 720 degrees Cent. for 20 minutes.	2.839	2.852	2.866	12,275	21,773	2.0
9S—Remainder of metal from No.	2.823	2.852	2.840	12,813	19,702	2.0
9D 8. Treatment: Treated with 0.1 per cent sodium.	2.826	2.834	2.844	11,738	17,741	3.0

*These castings were unsound due to the very low casting temperature, and are not representative (see note in text). They were practically free from "pinholes."

effective with the 3L11 alloy.

The improvement obtainable where the temperature has been taken to 760 degrees Cent. (1400 degrees Fahr.) is relatively small. A finishing temperature of 750 to 760 degrees Cent. (1382 to 1400 degrees Fahr.) is necessary under production conditions, since due allowance must be made for heat loss in the transference of the metal to the mold which is cast at 690 to 720 degrees Cent. (1274 to 1328 degrees Fahr.).

Absorbs Gases More Rapidly

It would appear that with gas-fired iron pot furnaces, the rate of deterioration of the metal due to the absorption of furnace gases may become, at the higher temperatures, more rapid than the beneficial action of the nitrogen and chlorine treatment.

Use of titanium tetrachloride for the removal of dissolved gas and grain refinement in aluminum alloy metals has been investigated by Rosenhain, Grogan, and Schofield, *Journal*, Institute of Metals (London) 1930. Similar experiments have been made on the four alloys using both the method due to Rosenhain for the introduction of the liquid titanium tetrachloride into the melt, and a method in which a ball of dry asbestos wool is soaked with a few cubic centimeters of the liquid and immediately plunged under the surface of the melt by an inverted crucible mounted on an iron rod.

Table IX

Effect of Titanium Tetrachloride

Ingot No.	Alloy	Treatment	Density	Appearance
17	M. "3L11"	None	2.810	Moderate
71	M. "2L5"	None	2.900	Moderate
72	M. "Y"	None	2.714	Moderate
73	M. Si	None	2.604	Moderate
213	M. "3L11"	4 c. c. titanium tetrachloride per pound—Rosenhain method	2.821	Several small pin holes
214	M. "2L5"	4 c. c. titanium tetrachloride per pound—Rosenhain method	2.915	A few small pin holes
217	M. "Y"	4 c. c. titanium tetrachloride per pound—Rosenhain method	2.740	Practically sound
216	M. Si	4 c. c. titanium tetrachloride per pound—Rosenhain method	2.635	A few large pinholes
56	M. "3L11"	4 c. c. titanium tetrachloride per pound soaked on asbestos wool	2.797	Several small pinholes
65	M. "3L11"	12 c. c. titanium tetrachloride per pound soaked on asbestos wool	2.778	Several small pinholes
78	M. "2L5"	4 c. c. titanium tetrachloride per pound soaked on asbestos wool	2.907	A few small pinholes
80	M. "Y"	4 c. c. titanium tetrachloride per pound soaked on asbestos wool	2.746	Practically sound
81	M. Si	4 c. c. titanium tetrachloride per pound soaked on asbestos wool	2.605	A few large pinholes

Table VIII

Chlorine and Nitrogen Treatment

Identification	Treatment	Density	Apearance
"2L5"-1 not treated	Not treated—average of several blocks taken.	2.920	Moderate.
'3L11"-not treated	Not treated—average of several blocks taken.	2.820	Moderately bad.
"2L5"-1	Chlorine and nitrogen for 30 minutes, 630-760 degrees Cent.	2.952	Fair to better.
"2L5"-3	Chlorine and nitrogen for 15 minutes, 630-760 degrees cent.	2.931	Fair to better.
"2L5"-4	Chlorine and nitrogen for 15 minutes, 630-760 degrees cent.	2.944	Fair to better.
"2L5"-7	Chlorine and nitrogen for 30 minutes, 630-760 degrees Cent.	2.893	Fair to better.
"2L5"-14a	Before treatment on melting at 640 degrees Cent.	2.939	Moderate.
"2L5"-14b	Chlorine and nitrogen at 640-680 degrees Cent. heating gas off 10 min.	2.977	Nearly sound.
"2L5"-14c	Chlorine and nitrogen at 680-705 degrees Cent. heating gas on 10 min.	2.959	Nearly sound.
"2L5"-14d	Chlorine and nitrogen at 705-760 degrees Cent. heating gas on 10 min.	2.931	Less nearly sound.
"3L11"-5	Chlorine and nitrogen for 20 minutes, 630-760 degrees Cent.		
"3L11"-6	Chlorine and nitrogen for 20 minutes, 630-760 degrees Cent.	2.800	Moderately bad.
"3L11"-8a	Chlorine and nitrogen at 630-660 degrees Cent. heating gas off 10 min.	2.844	Moderate.
"3L11"-8b	Chlorine and nitrogen at 660-720 degrees Cent. heating gas on 10 min.	2.827	Moderate.
"3L11"-8c	Chlorine and nitrogen at 720-760 degrees Cent. heating gas on 10 min.	2.828	Moderately bad.
"3L11"-9a	Chlorine and nitrogen at 630 770 degrees Cent. heating gas off 15 min.	2.844	Fair.
"3L11"-9b	Chlorine and nitrogen at 700-760 degrees Cent. heating gas on 10 min.	2.833	Moderately bad.

The large and objectionable volume of fume evolved from the melt during treatment, unless the rate of addition of the liquid is extremely slow, presents a great difficulty, especially when large quantities of metal are to be treated. In treating a 3-pound melt by the Rosenhain method, a rate of addition of not more than 2 cubic centimeters per minute must not be exceeded to avoid excessive evolution of fume.

Table IX gives the result of experiments made with 3-pound melts in the electric furnace. Treatment commenced immediately after melting and continued for about 15 minutes as the temperature rose to 700 degrees Cent. (1292 degrees Fahr.) —that employed for casting. Most of the experiments were made using 4 cubic centimeters of titanium tetrachloride per pound of alloy, an amount which Rosenhain, Grogan, and Schofield have shown to give satisfactory results.

Density Is Increased

An increase in density is observed with all alloys treated except the 3L11 alloy treated by the second method. The treatment appears to be more successful when the Rosenhain method is used. The Y (4 copper, 1.5 magnesium and 2 nickel) alloy is rendered practically sound by this treatment; the 12 per cent, silicon alloy is improved considerably; 2L5 (2.75 copper, 13.5 zinc) alloy and 3L11 (8 copper) alloy are improved, but only to a moderate extent. The visual appearance of sections of alloys treated with titanium tetrachloride is not a reliable

guide to soundness, since they sometimes are much less sound than they appear, as is well indicated by the density tests.

This is due to the marked grain refinement produced by titanium tetrachloride, which refines the unsoundness as well as the grain size, and reduces the size of the holes below the limit of visibility even when the total unsoundness is not reduced by treatment. For example, with ingot No. 65 a marked reduction in density has occurred, yet the visual appearance of the section is much improved. Examination under a low-power magnification shows the presence of a large number of pinholes of small dimensions.

The "Y" alloy is more amenable to treatment by titanium chloride than are the other alloys. This may be due to the presence of magnesium in this alloy. It was thought that advantage might be taken of the presence of a constituent having a relatively high partial pressure in a molten alloy to disturb the equilibrium existing between the metal and the gas held in solution.

In the case of the 2L5 alloy, which has a zinc content of more than 12 per cent (zinc boiling point 906 degrees Cent., 1662 degrees Fahr.), this constituent should exert a considerable partial pressure in the alloy at the more elevated temperatures. Three pounds of the M. 2L5 alloy were heated in the electric furnace to a temperature of 950 degrees Cent. (1742 degrees Fahr.) and held there for 1 hour, the melt being stirred vigorously from time to time. Some zinc volatilized, as was shown by spurts of blue flame from the surface of the melt in agitation.

The melt thus treated was allowed to cool to 750 degrees Cent. (1382 degrees Fahr.) before casting. This experiment was duplicated, with the following results: 2L5 alloy not treated, density, 2.900; 2L5 alloy treated, density, 2.929, and 2L5 alloy treated, density, 2.938. The treated ingots are practically free from pinholes, and show an increase in density; they do not exhibit, to any marked extent, the central shrinkage cavity.

Cadmium has a relatively low boiling point of 767 degrees Cent. (1412 degrees Fahr.), and is soluble in pure aluminum to only a limited extent. The presence of cadmium in aluminum alloys is stated not to be deleterious.

Quantities of up to 1 per cent cadmium were added to 3-pound melts, of the 3L11 alloy heated in the electric furnace. The addition was made immediately on melting, the alloy being stirred occasionally as the temperature rose to 800 degrees Cent. (1472 degrees Fahr.).

After 30 minutes at this temperature, the melt was allowed to cool to the casting temperature of 700 degrees Cent. (1292 degrees Fahr.). There was no visible evidence of a reaction between the melt and the added cadmium. Three melts were treated with the results as shown in Table VI. Little change in the amount of pinholing has occurred. The pinholes present appeared to be less rounded and more angular. The increase observed in density is accounted for by cadmium (density 8.6) retained in the casting.

This is the second of three articles on the causes and prevention of pinholing in aluminum sand castings. The first appeared in the Feb. 1 issue, and the third will appear in an early issue.

THE EDITORS

Relay Iron Pipe 75 Years Old

A NUMBER of sections of 30-inch cast iron pipe laid in St. Louis almost three quarters of a century ago, are shown in the accompanying illustration, which is reproduced through the courtesy of the *U. S. Piper*, a publication issued quarterly by the United States Pipe & Foundry Co., Burlington, N. J. Although not a part of the first pipe line laid in the one time frontier city, and although not by any means as ancient as some pipe lines doing service elsewhere, these pipe sections —still in perfect condition—are of special interest because they were cast in a local foundry at a period when such a feat probably could not be duplicated in any foundry west of the Mississippi.

Constant growth of the city necessitated frequent changes, additions and improvements in any to the water system. Thus in the St. Louis city water department records we find that on April 30, 1857 the superintendent recommended the laying of a new 20-inch main from the pumping plant at the levee and Bates (now Dickson) Street, to Broadway and Cass Avenue. This meant a double 20-inch line between these two points. He further recommend-

After Nearly 75 Years Service Under St. Louis Streets, 30-inch Pipe Line Shows No Sign of Deterioration

ed that at the terminal the two lines were to be merged into a 30-inch line which would extend to the south wall of the reservoir at Maiden Lane. The estimated cost of the line was $120,000, or approximately half a million dollars according to present conditions and standards. As with any measure that has to pass through the hands, or meet with the approval of many men, this particular recommendation finally emerged as a decision to extend the 30-inch main to the levee.

After all the preliminaries had been arranged, the contract for supplying the pipe was awarded to Graham & Newman, a local foundry company at that time engaged in the manufacture of cast iron pipe. Apparently the 30-inch size was beyond their usual range, for the first delivery of 151 pieces was not made until April 19, 1858, almost a year after the water works superintendent had made his recommendation. Presumably part of that time was consumed in the usual time wasting sessions of the city council, but it is reasonable to assume that Graham & Newman had to build new equipment to handle this job.

The pipe were cast at the rate of six per day and the total order of 754 pieces was cleaned up and delivered by Oct. 7, 1858. By the time the last delivery was made, a mile of the pipe had been laid. When dug up recently for inspection and relaying elsewhere, the pipe was found to be as good as on the day it was laid originally, a tribute to the permanence of cast iron. The condition of the pipe is shown in the illustration.

Reader's Comment

EDITOR'S NOTE—*Material Appearing Under This Head Does Not Necessarily Reflect the Opinion of* THE FOUNDRY *or of Its Editors.*

Adopt Special Gate

TO THE EDITORS:

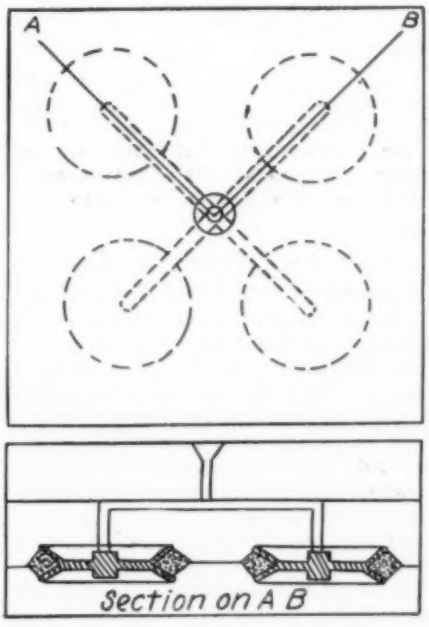
In one of his articles on gates and risers, Pat Dwyer directs attention to the fact that many shop kinks are common property and that it is idle to attempt to trace their origin or the name of the first man who tried any of them out. In many instances a man hits on what he imagines is an original idea, and is surprised later to learn that a second man and maybe a third and a fourth, adopted the same idea at or about the same time and this without concious communication of any kind between the interested parties.

An instance of this kind has been brought to my attention while reading the Oct. 15 issue of THE FOUNDRY containing No. 19 of the series on gates and including reference to a method of using an extra cope to secure distribution of metal to many runners from a single central sprue. According to the published report this method was originated and used in a foundry in one of the eastern states about 10 years ago. Several years ago without any knowledge of this development, I tried out the same idea here in Australia, in a foundry about as far from the first as it is possible to get them on the globe.

We had an order for 100 small cast iron sheaves and we molded them four in a flask. At first we gated them on the rim, but in many instances that method left a gap in the rim and spoiled the casting. Then we tried pouring them individually on the hub, but usually only secured one good casting out of the four. Gas collected in each of the mold cavities after the first casting was poured. With the entrance of the first drop of iron this gas exploded and wrecked part of the delicate green sand ring core. Finally the idea occurred to me to cut channels in the top of the cope connecting the four sprues. Then cover this with a second cope containing a central sprue. Obviously, metal poured into the central sprue would flow through the horizontal channels, down the individual sprues leading to the hubs of the four sheaves and thus fill the four mold cavities simultaneously. We have employed the method on many other molds since that time.

THOMAS JOHNSON

Melbourne, Australia.



Metal from a Single Sprue in the Extra Cope Was Distributed Through Horizontal Runners to Individual Sprues on Each of the Four Molds

To Train Apprentices

TO THE EDITORS:

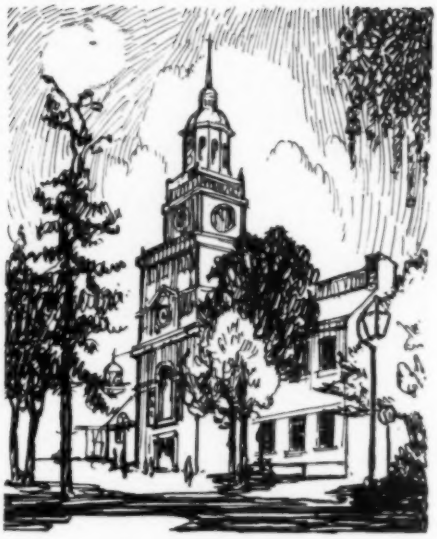
Considerable variation of opinion was expressed by a group of foundrymen who attended a recent branch meeting of the Institute of British Foundrymen on the subject of apprentice training and the amount of education to which an applicant should aspire before and during the training period. One member definitely was opposed to the class idea of training apprentices. He claimed that with some boys it was a waste of time and with others, it put false notions in their minds. They became dissatisfied with their jobs in the foundry. If he had his way he would place the apprentice for an hour several times a week with the foreman, or with a highly skilled molder to learn the why and the wherefore of foundry processes. That was all the special education any apprentice needed. The average school education received by a boy up to the age of 14 was quite ample to fit him for the foundry if he could be induced to enter it. At the other extreme another member claimed that the foundry now is more or less scientifically controlled and the more a boy could learn of the technical side of the business, the better chance he would have of understanding what was required of him.

Many practical foundrymen will be inclined to agree with the views of the first speaker. In the great majority of instances the apprentices who complete their terms will work as molders for the remainder of their active existence. A certain number have no ambition to improve their condition. Members of a second group are temperamentally unfitted either through natural timidity or laziness—mental or physical—to occupy positions of responsibility. The relatively small number of supervisory positions in proportion to the total number of foundry employes, automatically condems members of a third group to jobs on the floor, the bench or the machine. Only a comparatively small number ever will wiggle upward to positions where a comprehensive technical and practical knowledge is required, and members of this small group invariably are endowed with sufficient initiative, perseverance and curiosity to acquire the necessary education for themselves. Two old proverbs about the difficulty of making a silk purse from a sow's ear, and the impossibility of forcing a horse to drink after he has been led to the old stone trough are applicable.

The utopian dream of some foundrymen of filling their shops with a group of highly skilled technical and

(*Concluded on Page* 30)

Philadelphia Prepares Welcome For A. F. A.



PLANS for the various activities, which will feature the annual convention and exhibition of the American Foundrymen's association, rapidly are taking form. The arrangement of details for the exhibition of foundry equipment and supplies, the selection of papers to be presented on the technical program and the organization of entertainment features all are progressing rapidly and definite announcements will be released in the near future. Preliminary reports predict a most interesting and valuable meeting in Philadelphia the week of May 2.

Appoint Committee Chairman

To provide hospitable entertainment for the convention visitors, the Philadelphia Foundrymen's association recently appointed chairmen for the various local committees that will arrange certain features usually undertaken by the local foundrymen, such as plant visitation, ladies entertainment, golf, etc. The various committee chairmen have selected the individual members of the committees.

The following committee chairmen recently were announced by the Philadelphia association: GENERAL CHAIRMAN, Julian B. Greenstreet, president, Philadelphia Foundrymen's association and general superintendent, Olney Foundry Co.; RECEPTION COMMITTEE, Laird U. Park, Park & Williams Inc.; PLANT VISITATION COMMITTEE, Harry Titgen, Tabor Mfg. Co.; HOTEL COMMITTEE, Frank Devine, Philadelphia chamber of commerce; TRANSPORTATION COMMITTEE, H. L. Henszey, Carborundum Co.; PUBLICITY COMMITTEE, Thomas D. Richter, Philadelphia chamber of commerce; LADIES ENTERTAINMENT, Mrs. B. H. Johnson, 414 Westview road, Elkins Park, Pa.; GOLF COMMITTEE, T. H. Addie, American Manganese Bronze Co.; member ex-officio of all committees, Earl S. Sparks, secretary, Philadelphia Foundrymen's association.

Interest in the exhibition of equipment and supplies has been accelerated considerably by the announcement that the National Industrial and Equipment congress, sponsored by the American Society of Mechanical Engineers, will be combined with the annual A. F. A. show to comprise the Foundry and Industrial exposition. This arrangement will permit foundrymen attending the Philadelphia meeting to have the benefit of the broad experience of two important technical societies on the various phases of material handling and management problems.

Popular demand and ever increasing interest has assured a complete schedule of shop operation courses for the 1932 convention. The program for the shop courses, which will include four sessions on foundry and control, four on gray iron, three on steel, three on nonferrous practice and two on malleable iron production, is being arranged by a special committee with the following chairmen for the various divisions: FOUNDRY SAND CONTROL, V. A. Crosby, Studebaker Corp., South Bend, Ind.; GRAY IRON, P. T. Bancroft, John Deere Harvester Works, East Moline, Ill.; STEEL, P. E. McKinney, Bethlehem Steel Co., Bethlehem, Pa.; MALLEABLE IRON, J. B. Deisher, Columbia Malleable Castings Corp., Columbia, Pa.; NONFERROUS, H. M. St. John, Detroit Lubricator Co., Detroit.

Schedule Technical Sessions

Monday morning, May 2, will be devoted to committee meetings, and the general opening meeting will follow in the afternoon. Sessions on Tuesday morning will cover nonferrous founding, apprentice training, steel founding, and in the afternoon meetings will be held on steel, patternmaking and malleable practice. Wednesday morning will be devoted to nonferrous, steel and gray iron founding, and the afternoon to a nonferrous round table, malleable iron session and a meeting on sand control. Foundry costs and gray iron founding will feature the Thursday morning session, and the afternoon will be devoted to the business session with a special lecture, and a joint session on materials handling with the American Society of Mechanical Engineers. A meeting on gray iron is scheduled for Friday morning. The time schedule for the various shop operation courses will be announced later.

The exhibition will be open on Tuesday evening and invitations to attend will be extended to all metal manufacturing companies in the Philadelphia district, similar to the method followed at Cleveland in 1930. The annual banquet of the association is tentatively scheduled for Thursday evening, May 5.

Studies Certification

A far-reaching movement to stabilize the marketing of industrial products by industry-wide guarantees administered by trade associations and professional societies is revealed in the publication by the American Standards association of a report on the first comprehensive survey of the economic importance of certification and labeling activities in the United States.

The report, by Dr. P. G. Agnew, secretary, and J. W. McNair, staff engineer of the association, shows that manufactured commodities valued at over a billion dollars were sold last year by more than 50 industries under some plan of guaranteeing the quality to purchasers. These industries ranged from lumber to mirrors, and from heating systems to drugs.

The lumber industry furnishes an outstanding example of the extent to which this new type of marketing has permeated in industry, the report shows. At the present time 35 per cent of all the softwood cut in the United States is marked with a definite grade showing its quality, which the manufacturers guarantee to the purchasers. Nearly 50 per cent of all hardwood is sold under similar guarantees. Over four billion board feet of hardwoods are graded and certified annually.

Prevent Losses With Proper Gates and Risers

By Pat Dwyer

SOME of the material which appears in this and probably one or two succeeding chapters is taken from articles contributed to THE FOUNDRY from time to time by Charles Vickers, a widely known and recognized authority on all phases of nonferrous foundry practice. The material is included in this presentation to round out the series and for the benefit of many who did not see the articles originally.

Bushings sometimes are made by removing the center from solid metal cylinders, but usually they are cast to shape with a mold to form the outside and a core to form the inside. This applies particularly to sizes over 2 inches in diameter. The castings are known under various names, depending principally on the shape and size. Large bushings, long, heavy and comparatively small in diamteer are designated sleeves. In diameter of 12 inches and upward, and several feet in length, they are known as liners. Where the length is short in proportion to the diameter, the casting usually is called a ring. Many methods have been adopted for molding these castings and as a result, many types of gates are in existence.

Gates for Bushings

SIZE and shape of the casting usually dictate the most economical method for making the pattern equipment and the molds. Wherever possible the foundryman should be consulted in advance. Equipment, methods and established practice in one foundry do not always coincide with these features in other plants. Sand characteristics also have to be taken into account. A gating system perfectly satisfactory with one kind of sand, may prove a dismal failure with another. The most satisfactory method for the production of flanged bushings is to mold them flange down, with a gate at the bottom and a riser and auxiliary gate at the top. A different technique is required with aluminum bronze bushings. The metal must be admitted gently at the bottom and every effort must be made to cool the casting as rapidly as possible.

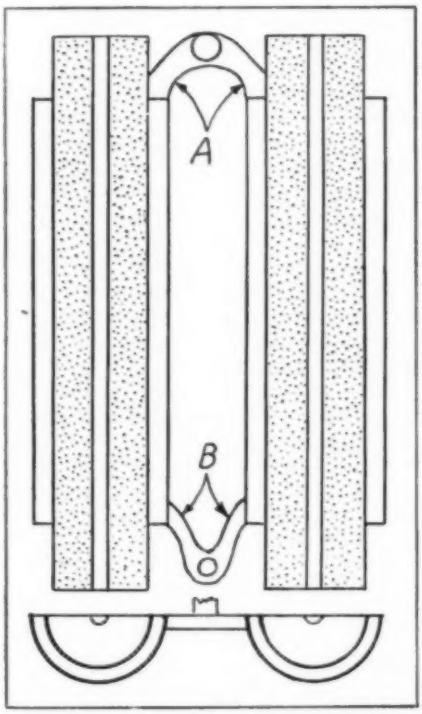


Fig. 140—Two Methods of Gating Long Bushings at the Ends

Some of the castings are poured horizontally. Some are poured in a vertical position and others are poured at any angle between. In some instances the position is decided through choice, while in others it is dictated through necessity. Where the castings are molded two in a flask horizontally, they are gated at one end and according to one of the two methods illustrated in Fig. 140. At *A* the gate occupies part of the core print, while at *B* the gate opens directly into the mold close to the end.

Another application of the *A*-type gate is shown in Fig. 141, the layout of runner, gates and bushing patterns where 16 castings are made in a flask. The same pattern plate serves for both cope and drag and as a result half the runner and half of each gate is in the drag and half is in the cope. Edges of the gates are filleted slightly to prevent the gate from *breaking in* to the casting when it is knocked off while still red. Nearly all brass and bronze castings are brittle when hot and advantage is taken of this fact to remove risers, gates and fins from the hot castings and thus save the expense of removing them later with a saw or a sprue cutter. A certain degree of skill, only to be learned through experience, is required to remove the gates without damaging the casting. As a general rule the runner or sprue is struck a sharp blow at right angles to the casting as in Fig. 141. At *A* and *B* in Fig. 140 the blow would be struck straight down with the castings in a horizontal position.

Gates for aluminum bronze and manganese bronze bushings usually are arranged to deliver the metal gently at or near the bottom of the casting. These metals must be handled carefully. A trifling commotion is sufficient to promote the formation of dross which in turn is bound to land some place and produce a large or small defective area in the casting.

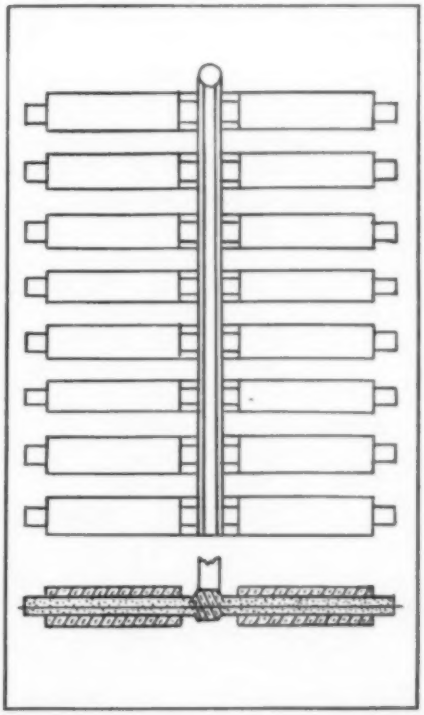


Fig. 141—The Sprue at One End Fills the Runner Which Feeds All the Gates

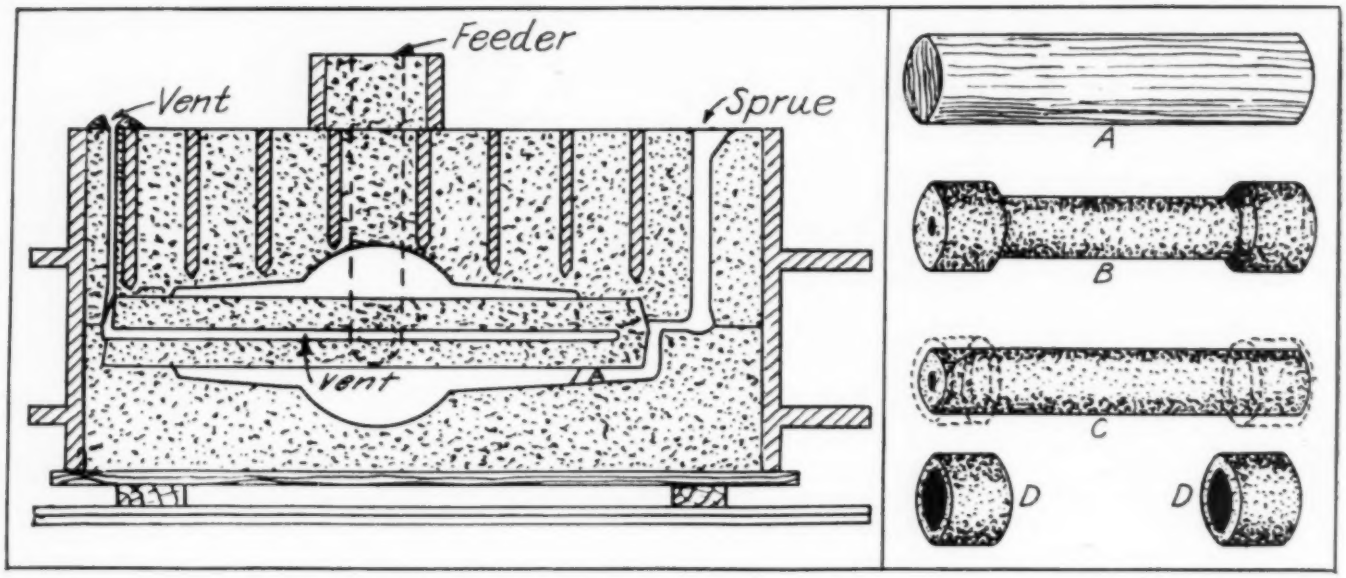


Fig. 142—*(Left)—Pressure on the Casting Is Secured Through a High Riser on the Center. Fig.* 143—*(Right) A Core with Enlarged Prints on the Ends Is Preferable to a Core Resting in Prints Left in the Mold by the Pattern*

Except under exceptional circumstances, the position of the gate on a bushing poured in a vertical position, is of little moment. The gate may be designed to admit the metal at the top, at the bottom, or at any intermediate point. As with gray iron castings of a similar design, large and small, a ring of small pop gates is favored by many foundrymen. In this connection also it is interesting to note that the gate frequently is blamed for defects in the casting that really are caused by a defective mold or core, usually the core. Unless the metal lies quietly in the mold, the casting will be a waster irrespective of what type of gating is adopted. In contrast to the foregoing, it is astonishing to note what liberties can be taken with the gates of a casting made in a perfect mold.

The bushing shown in Fig. 142 carries a ball shaped enlargement at the center which involves the use of a riser or feeder. This feeder may be placed directly on top, or erected at the center of one side as shown in the illustration. The feeder is built up several inches above the top of the cope to provide pressure. After the mold is filled, the top of the sprue is covered with sand and a weight. Then metal is poured slowly into the high feeder.

On this casting it was found by experience that the gate under the core at one end, as shown, produced the best results. Where a gate like that shown at *B*, Fig. 140, was tried, the metal impinged on the core and then caromed back against the wall of the mold. The result was a scabby area near the gate, and a dirty casting from the sand washed in with the metal.

Plain common sense indicates that the foundryman is the proper person to decide whether a bushing should be molded vertically or horizontally, but unfortunately in many instances the patterns are made and delivered to the foundryman without any preliminary consultation.

Make Dry Sand Prints

Where the pattern and end prints are turned from a single block of wood, and where no taper has been allowed on the prints, the molder will experience difficulty in lifting a clean cope irrespective of whether the mold is made vertically or horizontally. If the prints are tapered and fitted with central dowel pins, the pattern may be molded either in a horizontal or vertical position.

The usual pattern construction for medium size and large bushings designed to be molded horizontally exposes the mold to many hazards. In many instances the prints are not long enough to support the core properly. If the core is a little oversize the sand will crush around the print. If the core is undersize the metal will leak past the ends and enter the vent.

An improved type of pattern and core is shown in Fig. 143. It has been in use in several foundries for many years and has been described more than once in the technical press. Considering the many advantageous features one is moved to wonder at times why it has not been adopted universally. The pattern *A*, is a plain cylinder, tapered generously at the ends so that the cope may be lifted from it readily. The core as a unit

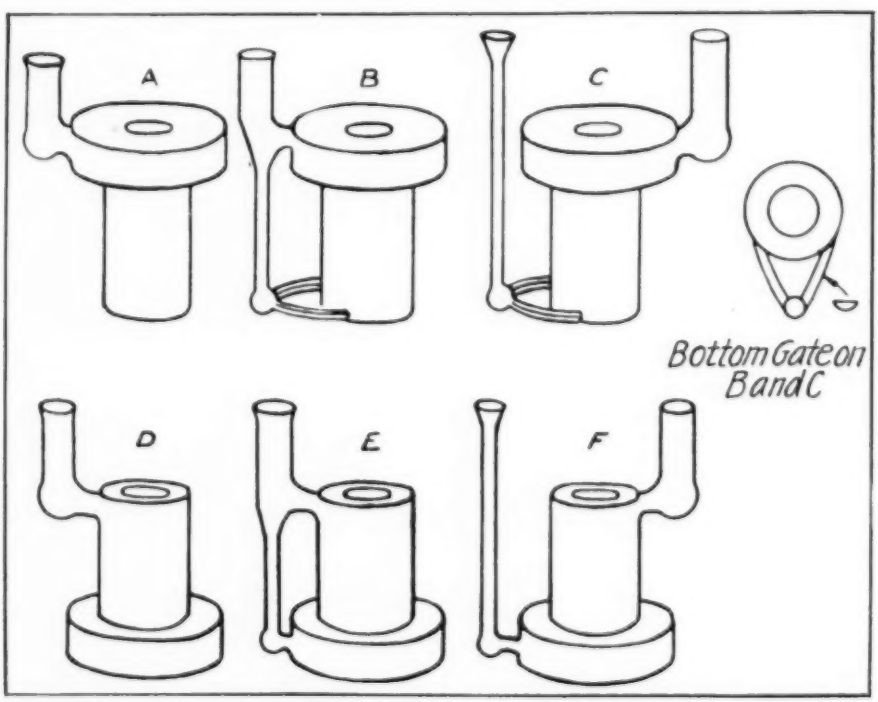


Fig. 144—*Top Gates Are Favored in Some Instances While Bottom Gates Are Preferred in Others*

is shown at *B*, while a built up core consisting of a plain stock or machine made core, and two short sleeve ends, is shown at *C* and *D*.

Instead of the usual restricted bearing area and the hazardous sharp edge of the ordinary type of core print, this core rests on broad dry sand bearings in a plain substantial green sand bed that will not yield. The style of core shown at *C* and *D* may be used to advantage on some occasions when bushings of varying lengths may be required from the same pattern. The short ring cores may be adjusted at any point along the main core. A small piece of wood in the ring corebox will serve to form the type of gate shown at *A* in Fig. 140. In an emergency the gate could be filed in the core.

If the core is a little slack it will be necessary to place a little mud or paste over the ends to prevent the metal from entering the core vent. However, if the core is a little full no anxiety need be felt for crushed core prints.

Red brass or gunmetal bushings flanged at one end are molded most conveniently in a vertical position, as shown in Fig. 144. In many instances the position of the flange, up or down, is an important factor in the final result. Usually the flange up method is the fastest while the flange down method is the safest. Under certain circumstances the speed of one method and the safety of the other may be secured by inverting the entire mold so that the drag may become the cope. In the flange up method with a gate at the joint, the metal falls with a splash and this in turn may cause scabbing, cutting and burning away of the sand in the vicinity of the falling stream.

Metal poured below the proper temperature may cause the casting to crack at the junction of the flange with the body. This happens at the time of solidification when the metal is weakest. The flange is held up by ledge of sand while the body shrinks into smaller bulk and then sinks through the force of gravity.

This factor of gravity enters into every shrinkage and contraction problem. Every foundryman knows that a casting will shrink away from the ends, the sides and the top or cope face of the mold, but no one ever saw a casting which the force of contraction or shrinkage had lifted from the bottom face of the mold. For example, consider the cubical casting and mold shown in exaggerated section in Fig. 148. If this block were to contract uniformly toward the center it would appear as at *R*, with a clear space between the casting and mold face at the top, bottom and sides. As a plain matter of fact it actually does appear as at *L*, with an open space at the top and all four sides, but resting solidly upon the bottom of the mold.

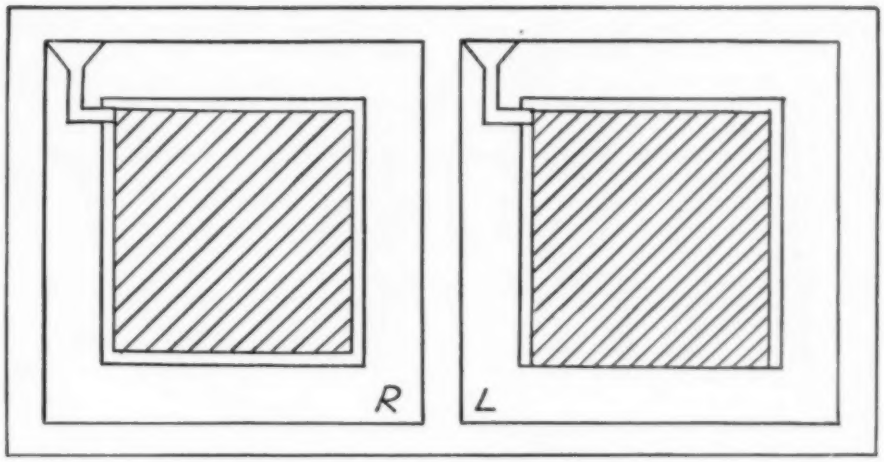


Fig. 148—Exaggerated View To Show How Gravity Affects Contraction and Shrinkage. The Casting Shrinks Away from the Top of the Mold and the Walls, but it Does Not Leave the Bottom

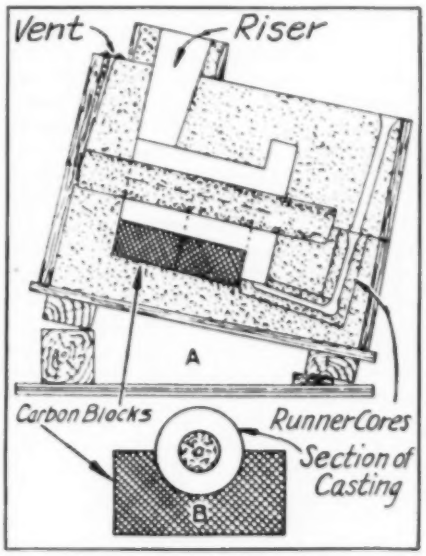
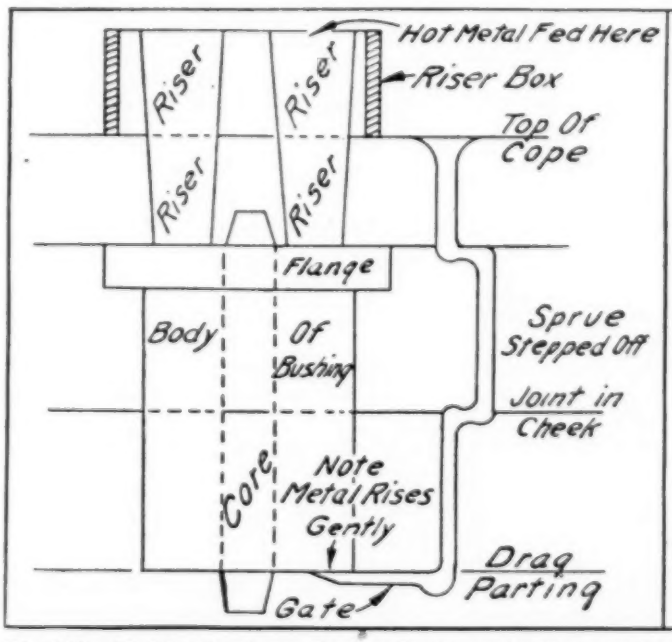


Fig. 147—The Casting Is Poured At the Bottom and Chilled with Carbon Blocks



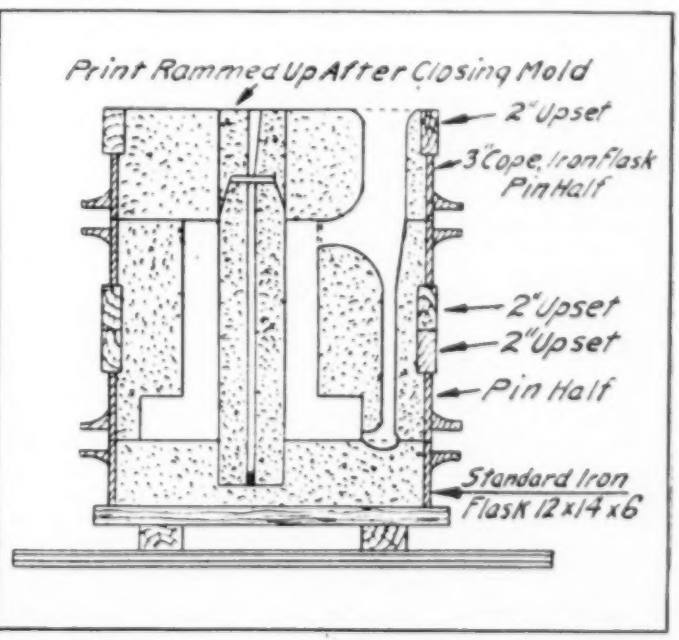


Fig 145—(Left) Aluminum Bronze Involves the Use of Elaborate Gates and Risers. Fig. 146—(Right) The Flange Is Gated at the Bottom and Fed Through a Side Riser Near the Top

Six methods of gating flanged bushings are shown in Fig. 144. Obviously the method shown at *A* is the simplest. A molder inexperienced in the vagaries of bronze would adopt it as a matter of course. However, these flanged bushings usually are machined all over. The customer expects a casting clean, smooth, true to pattern, homogenous in texture, with the inside clean and solid as minted gold when exposed by the tool. A combination of clean, hot metal and a mold made from free venting, strong, refractory sand, is required to meet these conditions. The combination is neither unusual or impossible, but it is found less frequently than it should be and that is the reason that method *A* in Fig. 144 is not always the most economical.

The gating arrangement shown at *B* considerably modifies the cutting action of the metal by conveying it first to the lowest part of the mold. The sprue should be small. A sprue 1 or 1¼ inches in diameter, about the diameter of a broom stick, will take the metal about as fast as it can be poured from a crucible. Also, if poured at the proper temperature, the metal will fill any mold within the filling capacity of the crucible. A sprue which cannot be kept filled allows the metal to strike the bottom with undue force. Sand washed or cut away by this action, is carried into the casting.

Sprue Serves as Feeder

In the method shown at *B*, Fig. 144, the upper part of the sprue is enlarged to serve as a feeder. Obviously the metal should not be poured faster than the bottom gate will take it, otherwise it will back up and enter the mold through the upper gate, before the proper time which is when the metal in the mold reaches the same level. The upper gate slopes down toward the sprue.

Hot metal entering at or near the top of the mold, raises the temperature of the metal which has cooled to some extent and reduces the danger of shrinks and cracks. The same general purpose is effected by the use of the gate on *E* in the same illustration. Of the two, the method *E* is preferable since the flange is molded down. This also applies to method *C* which could be molded the same as *B* except that the riser is independent of the sprue to prevent metal from entering prematurely by the upper gate as shown in *B* and *E*. Method *F* is preferable to method *C*. It costs no more to practice and practically is certain to yield satisfactory castings.

The method shown at *D* has nothing to recommend it. The chief objection to its use is that the fall of the metal almost certainly would damage the sand above the flange. Of the six usual methods shown in Fig. 144, *E* and *F* are the best, and *E* is slightly preferable to *F*, principally because it insures a more uniform temperature in the casting and thus secures more uniform contraction and shrinkage conditions.

A rectangular gate with the depth exceeding the width is the most satisfactory on bushings or in fact on nearly all castings. The corners should be filleted slightly so that the gate may be broken safely from a hot casting. The fillet also will prevent the formation of a *draw* or shrinkage defect, severe enough in some instances to condemn the casting.

Chill With Graphite Blocks

The foregoing methods are applicable to the red metals, to bronzes compounded mainly of copper and tin. They are not applicable to aluminum bronze castings. This is one of the instances where molding methods have to be changed in conformity with the peculiarities of the alloys. A method sometimes practiced of gating and feeding an aluminum bronze flanged bushing is shown in Fig. 145. This method is not recommended although the style of gate is approved. Despite the large risers which take almost as much metal as the casting, the result in the majority of instances will not be satisfactory.

A practically positive method for molding an aluminum bronze flanged bushing is illustrated in Fig. 147. The mold is made in a horizontal position and then slightly tilted before the metal is poured into it from the low end. The drag half of the casting, except the flange is chilled by the application of carbon blocks which conform to the shape of the pattern. The ends of the blocks are wetted with a solution of silicate of soda (water glass) in water to insure a union with the sand in the mold.

That part of the sprue in the drag, also the runner or long gate leading to the lowest point on the bushing flange, are made in dry sand runner cores in which the bonding agent is silicate of soda. In an emergency the gate can be cut in the sand of the mold and covered with dry sand slab cores. An entire dry sand passage for the metal is to be preferred.

With reasonable care, carbon chill blocks will last for an indefinite period and thus absorb their considerable first cost. They are stored carefully when not in use. In service their object is to cool the casting so that it will solidify before the feeder. Thus the feeder can fulfill its anticipated function with approximately one-third the amount of metal that would be required if the chill blocks were omitted from the mold.

Just before the mold is closed, the carbon blocks are heated to expel every vestige of moisture. This is accomplished readily according to any one of various methods. If an oil torch is not available, a couple of red hot ingots can be transferred for a short time from one of the furnaces to the joint of the mold. Owing to the heat conductivity of the carbon blocks, they readily absorb the heat from the ingots. This practice of heating the blocks is responsible for the necessity of using the silicate of soda solution for cementing the adjoining sand to the carbon blocks.

Immediately after the metal in the riser solidifies, the casting may be removed from the mold. The faster a casting of ordinary aluminum bronze is cooled, the stronger will be the metal. It is particularly advisable to remove massive castings from the sand as quickly as possible and allow them to air cool. When a bushing similar to that shown in Fig. 147 is removed from the mold, the carbon blocks will show a bright red color.

This is the twenty-seventh of a series of articles dealing with the various types of gates and risers used in the foundry industry. The twenty-eighth instalment will appear in an early issue.—THE EDITORS.

To Train Apprentices

(*Concluded from Page* 25)

practical men, is no more practical than an attempt to drill a regiment made up entirely of colonels, or to operate a vessel in which every member of the crew carries a master's ticket. So long as human nature is human nature and so long as industry depends on manual labor, some men will have to hew the wood and carry the water. Why add to their burden by sowing seeds that may germinate later as poisonous weeds of envy, jealousy and hatred? The law of the survival of the fittest still is in existence. By all means encourage the promising lads. They are few and will meet your efforts more than half way. Attempt to instill technical or theoretical knowledge in the others represents wasted effort.

ONE WHO HAS TRIED

Suffers Fire Loss

The British Cast Iron Research association, Birmingham, England, suffered a severe loss on Jan. 2 through a fire which burned the second and third stories, and the roof of the building it occupies. The ground floor containing the offices and library was damaged with water. The two floors burnt out were occupied by the research laboratories, and the apparatus which they contained was destroyed.

Production of malleable castings during December totaled 21,200 net tons, compared with 17,736 tons in November, according to a recent report from the department of commerce. Orders booked during December totaled 19,493 tons against 18,658 tons in the previous month.

Questions & Answers on FOUNDRY PRACTICE

THIS department covers all problems relating to metallurgical, melting and molding practice encountered in making steel, malleable-iron and gray-iron castings. Questions submitted by bonafide subscribers to this department will be answered by members of the editorial staff of The Foundry, supplemented where occasion requires by the advisory staff whose personnel is as follows:

John H. Hall
Cast Steel

H. A. Schwartz
Malleable Cast Iron

J. W. Bolton
Gray Cast Iron

All questions must be addressed to the Editor, The Foundry, Penton Building, Cleveland.

STEEL

Place Insert in Ball

We are contemplating the manufacture of high carbon steel balls 5 inches diameter according to the following plans: Lower half of the mold a chill, upper part green sand, a vertical chill rod in the center of each, metal poured through a small gate on top connected on a slant with a central runner, and with six balls to a flask. We shall appreciate your comment on this proposal.

Your proposed method of casting high carbon 5-inch steel balls is interesting and seems feasible. We have no personal knowledge of any plant in which grinding balls are produced in this manner and certainly we shall be glad to learn what measure of success you have had when and if you try the experiment. Up to the present most of these castings have been made of manganese and chrome steel or of white iron. An interesting article on the subject by Larry J. Barton appeared in the April 15, 1926 issue of THE FOUNDRY.

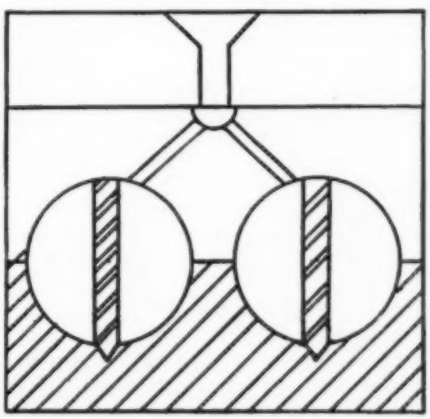
The insert or internal chill in each casting will aid in preventing a shrinkage cavity on top of the ball. Our only fear is that when the ball eventually wears down, the insert will work loose. To pour the castings on top according to your plan you will have to place an extra cope on each mold as shown in the accompanying sketch.

GENERAL

Castings Do Not Last

We are having some trouble with stoker castings that we are making for one of our customers. The castings do not last long enough, and we would like to obtain information on what the most desirable grade of iron is for that type of work.

Iron with a white fracture probably would be excellent for stoker castings if it were not so brittle, and unmachinable. Iron with a mottled fracture will give better service than the gray variety, and the degree of mottling will depend on whether or not the castings are to be machined. If machining is necessary, the fracture of the castings must be toward the gray side while if machining is not necessary the fracture can approach the white side.



A Chill Forms the Lower Half of the Grinding Ball Mold

The appearance of the fracture may be controlled by decreasing or increasing the silicon content, and since you do not state the thickness of the stoker castings you are making, it will be difficult to give a desirable silicon content. The range of silicon in ordinary grate bars is from 1.25 to 1.75 per cent, and we suggest trying the lower value for the stoker castings. If the fracture still is quite gray, keep reducing the silicon content until the desired structure is obtained.

MALLEABLE

Structure Shows Frame

Can you give me any information on the causes of egg shell frame in annealed malleable castings?

By *egg shell frame*, presumably you are referring to what often is called the picture frame structure which shows upon fracture of the specimen, a decarbonized surface skin, a fiery bright, finely crystalline inner ring, and the normal black core. The condition may be caused by low silicon, carbon or manganese. Specimens examined by Touceda contained 0.54 per cent silicon; 0.162 per cent phosphorus; 0.053 per cent sulphur; 0.108 per cent manganese, and 2.01 per cent total carbon. The specimens when polished and etched showed the structure outlined previously. The bright ring is pearlite which is much less ductile than either the decarbonized skin or black core. High sulphur, particularly when not balanced by manganese usually gives the picture frame structure. High manganese when not balanced by the sulphur also shows the same structure.

Schwartz, *Transactions* of the American Foundrymen's association, 1928,

says that it is possible in some cases decarbonization may take place to a point around 1 per cent of total carbon before any graphitization has occurred. Graphitization then will be initiated with great difficulty, and especially upon cooling below A_1 it will proceed only slowly because of the infrequency of graphite nuclei, and a pearlitic rim will be the consequence. However, if the metal is more or less completely graphitized before decarburization occurs, the ring or frame will not appear.

Make Radiator Castings

Can you send us information regarding methods used in molding steam and hot water radiators?

Under present conditions, most radiator castings are molded, poured, shaken out, cleaned, tested, machined and assembled on conveyor units. In many plants, a mechanical device rams the sand in a manner approximating hand ramming. Plain, strong flasks are used, with no bars in the smaller sizes and only one or two in the larger sizes. These bars are designed principally to prevent the flasks from spreading. Metal patterns, split along the center line are mounted on stripping plates and are dropped a short distance before the cope or drag is lifted away.

Special chaplets known as radiator chaplets, and consisting of a wire stem and a ½-inch square base are rammed up with the pattern. The stem rests in a hole in the pattern, the same depth as the desired thickness of metal in the casting. The square base is sufficient to support the weight of the core in the drag, and the upward pressure of metal in the cope. The number of chaplets depends on the size of the core. The sand in the molds is open and permeable to permit the free escape of gas and steam without the necessity of using a vent wire. Sharp and bonded with oil is used for making the cores. Each core is made as a complete unit with a vent channel in the center of each section. The two half cores made in adjoining half coreboxes are *booked*, placed in a dryer shell as a unit and then dried. Detailed description of the methods and equipment employed in many prominent American radiator foundries has appeared in THE FOUNDRY on many occasions.

Problems in Nonferrous Founding

By Charles Vickers

Salt Is Not Necessary

Are there any benefits to be derived from, or ill effects encountered from the use of molasses or salt or both in brass molding sand for green sand work? Our work must be free from surface holes and oxide inclusions. I have never heard of the use of the substances mentioned in green sand molding, but understand that they are used to a large extent in a certain part of the country. Also, should different sand be used for red brass than for yellow brass?

We can see no value in using molasses in green sand molding as its bonding power only is developed after drying. Molds which are to be skin dried sometimes are sprayed with molasses water especially along thin edges to give stronger bonding at those points. Graphite or plumbago facings which are sprayed on some mold faces also are often mixed with molasses water. Salt or sodium chloride melts at 1481 degrees Fahr., and we believe that it will fuse to the castings, and probably cause trouble. We are wondering if instead of the salt being used in the sand, that it is used for a flux or cover upon the metal.

The same sand may be used for red or yellow brass if the weights of the castings are about the same. The only need for change of sand would be on changing from light to medium to heavy castings. As the castings increase in size, the sand should be coarser to allow the escape of gases formed during pouring, more readily.

Cleans Brass Castings

We have some small brass castings that have been used and are coated with an accumulation of oil, tallow and similar greases. Is it possible to reclaim them, and get them as near the original color as possible?

The first operation in reclaiming the brass castings will be to remove the coating of oil and grease. That may be accomplished by immersing the castings in an alkaline cleaning solution of the following composition: 4 ounces of soda ash, 2 ounces of trisodium phosphate, ½-ounce of whale oil soap, ½-ounce of caustic soda (lye), and 1 gallon of water. The solution should be used hot, and the removal of the grease will proceed more rapidly if the castings are agitated in the solution.

When all the grease has been removed from the castings, they should be rinsed in hot and then cold water. Use running water if possible. The castings now are ready to be restored to the original color, and that is accomplished by giving them an acid dip, usually called a bright dip. The following bath will be suitable: 2 quarts of concentrated sulphuric acid, 18 fluid ounces of concentrated nitric acid, 1/10-fluid ounce of concentrated hydrochloric acid, and water to make 1 gallon. Sometimes a little soot is used in the solution to give a more even attack.

The castings are immersed in the acid bath until the desired color is obtained which probably will take only a few seconds, and then removed to a bath containing running water. Then the castings are dipped in hot water, allowed to drain and dried in warm sawdust.

Peeling Takes Place

We are trying to find a lead base alloy for slush die casting that can be silver plated directly without first copper plating. We have been able to plate some of the alloys directly, but peeling takes place.

Many lead and tin alloys are plated directly without an intervening copper plate, and it may be that your difficulty arises from your plating practice rather than from the alloys used. One alloy containing 85.5 per cent lead, 12.5 per cent antimony, and 2 per cent tin is used for making casket hardware, and it may prove suitable for your work. Undoubtedly, there are a number of other alloys that may be suitable, but we suggest the casket alloy as a starting place.

The following method is suggested to obtain a solid adherent coating of silver. Clean the polished castings in a hot solution containing 6 ounces of soda ash, 2 ounces of caustic soda (lye), 2 ounces of trisodium phosphate and 1 gallon of water to remove the oil and grease. Do not let the casting stay in the solution any longer than is necessary, but be sure that oil and grease are removed. Then lift the work from the alkaline cleaner and place directly in a silver strike solution which is weak in silver, but strong in cyanide.

A strike of the following composition is suitable: Silver, 0.6 ounces Troy; sodium cyanide, 20 ounces avoirdupois, and water 1 gallon. Leave the castings in the solution until a thin coat of silver is deposited. Remove and scratch brush the coat, rinse, and then transfer to the regular silver plating bath until a coat of the desired thickness is obtained.

The FOUNDRY Family Photograph Album

Upper Left

GEO. F. PETTINOS

George F. Pettinos, Inc.,

Philadelphia

Upper Right

HOBART S. JOHNSON

Gisholt Machine Co.,

Madison, Wis.

Lower Left

JAMES R. ALLEN

International Harvester Co.,

Chicago

Lower Right

J. M. TAYLOR

National Founders Association

Chicago

BILL

By Pat Dwyer

Notes Changes in Foundry Methods

EXTENT to which times and manner change was brought home to me forcibly when I read a brief news item in the paper dealing with the activities of a small pack of wolves somewhere north of the Soo, an anglicized and denatured version of Sault Sainte Marie the old French name for the falls of the St. Mary's river connecting lakes Superior and Huron. Whether this is the river Saint Marie that has been pouring through the radio for the past year—the magical, mystical home of a marvelous maiden—I am not prepared to say. Up to the present I have taken no steps or formulated no plans to dispel my ignorance on this point. What! You too?

According to the news item, a small pack of wolves had chased a man across a field or a farm or something like that, but had failed to catch him. The entire story just made a short filler paragraph for the end of a column.

Not so long ago the hunting wolf pack was one of the favorite props in every writing man's bag of tricks. Whenever the action began to drag, whenever the author felt the need of quickening the reader's interest he threw off the leash and speeded the ravening wolf pack on the trail of the hero.

In some instances the hero was alone, either on foot or on horseback. If on foot he invariably managed to swing into the branches of a friendly tree a split second before the jaws of the leading wolf snapped on his feet. If on horseback, the gallant steed, neighing in the keenest and most agonizing terror, collapsed within 100 yards of the old log hut in the forest. Quickly disengaging himself from the stirrups, the hero ran the intervening 100 yards while the devilish pack was tearing the body of the horse to pieces and gulping the fragments in a manner to produce the most acute indigestion.

Filled with vim, vigor, vinegar, venom and horse meat (Try to say that one quickly!) the pack then danced a ring-a-rosy around the hut in the wildwood, the dear little cot in the dell. All the intrepid young man in the buckskin shirt and the beaded leggings had to do was to pick 'em off (the wolves to you) one by one with his trusty rifle until the entire pack was exterminated in toto.

If the author desired to still further harrow the reader's feelings, to put a sharper edge to the interest already at fever heat—no, that won't do. Forceful, of course, but not quite accurate. Let's start over again.

Where the author desired to increase the suspense, heighten the dramatic value, pack an extra punch in the chapter and incidentaly add a few dollars to the value of a space

It's Probably There or Thereabouts!

rate story, he exhausted the hero's ammunition at a stage when approximately half the wolf pack still was unexterminated. The courage, strength and ferocity of this fraction fringed on the supernatural when one considered that the component parts had been traveling for a couple of months without food or water in the desert of ice and snow between the scene of the story and their original home away back beyond hellangone to the North.

When all hope seemed lost, windows broken, door loose on the hinges, wolves scrambling down the chimney and poking their evil faces through every opening in the walls; when in fact—despite the author's reputation of never having lost a hero—you were willing to bet two to one that the lad was doomed this time, what happened?

Picking up a large flat stone from the hearth with the laudable intention of mashing the first wolf to a pulp, the hero discovered an opening into which he immediately dropped and which ultimately led him to a vein of gold in the heart of the hills, rich beyond the d-r-r-r-eams of avarice. A second secret passage conducted him to his friends and freedom.

This was the plain, straightforward type of wolf story, retailed primarily for masculine readers who thrilled to the spirit of adventure and the atmosphere of the great open places. Primal emotions were stirred. The lust for blood that has persisted since the cave man first established the right to have and to hold by his ability to get in the first few shrewd belts with a club or a small bowlder, was aroused and satiated in these stories. The reader without any concious effort became the principal character. He tasted the sweets of victory and he almost went down in defeat. When a pack of wolves attacked him, it was just too bad—for the pack. He jealously counted each one picked off in the fight and actually breathed a sigh of pleasure and content when the tally showed every wolf present and accounted for—with a bullet hole fair between the eyes.

The second type of wolf story was designed to appeal to both feminine and masculine readers and with that end in view, THE GIRL was introduced in the first chapter. Thereafter she appears in every scene, gums up the game generally, constantly falls over cliffs, into rivers or into the hands of the oily villain and his bunch of renegades. Most of the hero's time and that of the other respectable characters in the story is devoted to rescuing the beautiful dummy from situations into which a child of ten would not stumble.

In the great wolf scene she is lost on the prairie in a blizzard with no one but her faithful pony to breathe down the back of her neck and prevent her from freezing to death. Comes the dawn, a lull in the storm *and* the inevitable pack of wolves bearing down in full cry. Under other conditions, the frightened pony would dash away and leave her to the mercy of the enemy. Of course that never would do in the present instance with the wolves a scant half mile away and no succor in sight.

Jumping on the pony's back she

rips the spur into him and then knows nothing more until the hero ranges alongside on his prancing stallion, snatches the lady under his arm, pivots his horse on the two hind feet and then dashes for the distant ranch and freedom. In the meantime the wolves have not been idle. Interference of a third party has stirred their righteous indignation. They shift from second into first speed, drool a little more at the mouth, raise their voices a little higher and, "in a word (to quote from the original) strain every effort to overtake the beautiful maiden and her gallant rescuer, e'er they attain their distant goal."

At several stages in the breath taking dash for the ranch, the leading wolf extends himself to make a special flying tackle and misses his objective by a scant few inches. Not by yards or feet, but by inches, and only a few of them at that. A few inches more on the end of the cruel fangs, or a few degrees more of energy in that last final spring and the story would have ended right there!

However, the career of the leading wolf ends right there. Although slightly handicapped by the burden under his arm, and the necessity of guiding his horse on a headlong course, the hero draws a heavy revolver from a holster and apparently without taking the slightest aim, sends a ball crashing through the forehead of the leading wolf. The pack obligingly pauses to distribute the remains to the best advantage and the hero successfully crosses the 50 yard line. By a succession of these maneuvers he crosses the other lines in turn and finally drops his burden for a touchdown inside the boundaries of the ranch.

However, as I said in the beginning, all this has changed. Wolves no longer figure in works of fiction. An interesting hour might be spent in speculating on the cause or causes responsible for scrapping the standard old standby, but the result probably would show that the advent of the automobile was the main factor. Pitted against a good road and a fast car, ole Br'er Wolf had not a fiddler's chance in—Well, a fiddler's chance.

According to Bill, the same thing is taking place in the foundry. Mechanical equipment and new methods have displaced many old time worn processes.

"For instance," he said "consider the bronze trolley wheels used on street cars and other electrically propelled vehicles. By the old method these castings were made four in a flask with dry sand ring cores. In many instances the skin in the grooves was not smooth. They might be satisfactory enough from a service standpoint, but the customers objected to the rough appearance.

"A smooth skin may be secured by the use of a fine grade of sand in the molds and cores. In this connection it may not be out of place to direct attention to the danger incident to substituting fine for coarse sand. Coarse, open sand may be abused to a considerable extent and still produce fairly satisfactory castings. A molder accustomed to that kind of sand will bump into some unpleasant experiences when he switches to fine sand, unless he is familiar with the peculiarities of both varieties and governs his actions accordingly.

"Water content in fine sand must be held to a minimum and the rammer, where the sand is rammed by hand, must be wielded gently. Where the vent will escape readily from a ring core made from an open grade of sand, it will require artificial passages made by a vent wire before it can escape from a core made in fine sand. The only exception to this rule is where the core is made from an exceedingly fine grade of sharp sand bonded with a minimum amount of oil or any other binder.

"The molds formerly were made in snap flasks on the bench, or on squeezer machines and presented no particular difficulty. The only objectional features were the rough surface and the fins around the edges, incident to the use of dry sand cores. This does not mean that all dry sand cores leave rough surfaces, or that all dry sand cores do not fit closely in the

A Great Place to Croon a Ditty To the River Saint Marie

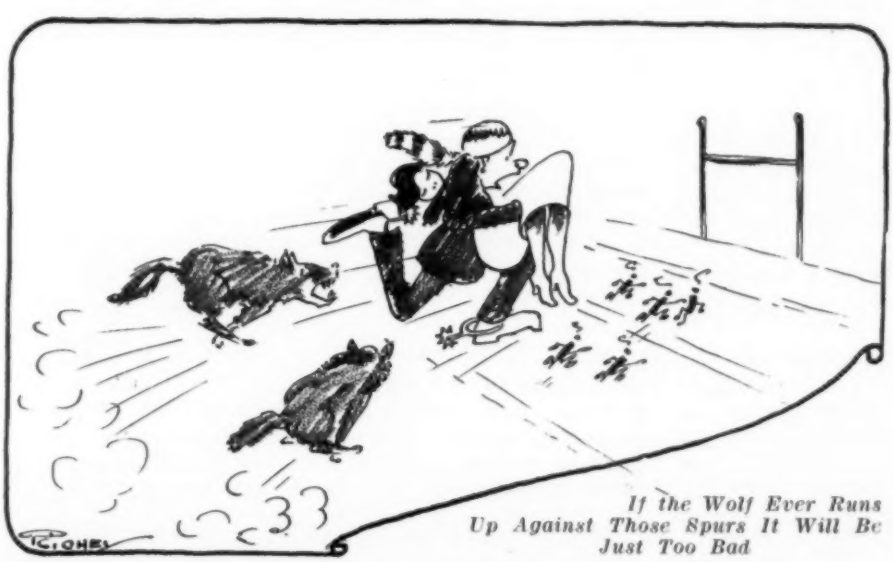
prints. Dry sand cores in most instances are free of these defects, but under former conditions they often were present in trolley wheel castings. In fact they may be found up to the present in foundries where the management does not consider the volume of business sufficient to pay for adequate rigging.

"I often wonder why some men are so shy in asking for information. An inquiry addressed to molding machine manufacturers and makers of pattern equipment, as listed in THE FOUNDRY, will bring eye opening data. With all the available information on patternmaking and molding equipment, there is little or no excuse for foundrymen sticking to obsolete methods and equipment.

"In a foundry which I visited some time ago grooved trolley wheels are made four in a flask, 190 flasks per day by a molder and helper on a squeezer type molding machine. Four plain disk patterns are used to form the mold. In this respect the method and equipment are similar to that in use in many places. However, the cores are made in green sand and that is one of the distinctive features of the method practiced in this particular foundry.

"The green sand core for forming the groove is made in a two-part metal corebox mounted on a stand close to the molding machine. The

(*Concluded on Page* 42)



If the Wolf Ever Runs Up Against Those Spurs It Will Be Just Too Bad

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¶ Advertising Pays

WHILE the pessimists and amateur spokesmen without license from the foundry industry are prone to call attention to this and that instance where castings have been replaced by materials fabricated in other ways, it is refreshing to run across the manufacturer who appreciates the merits of castings. For example, an enterprising foundryman visiting the International Heating and Ventilating exposition held in Cleveland during the latter part of January, stated that the exhibition demonstrated a large and growing field where castings still are preferred. In addition, he absorbed some valuable ideas on new uses for castings.

HIS remark that castings had the upper hand in the heating field is not an exaggeration. While some furnaces were of sheet metal or fabricated construction, they were far in the minority. Castings played important parts in oil burner and gas burner construction as parts of or the complete burners, fans supplying the secondary air, valves and fittings for steam and hot water systems, radiators for steam and hot water heating, propeller type fans for exhausting and ventilating equipment, humidifiers, etc.

MANY of the manufacturers stress the fact that castings are used in constructing their equipment as may be seen from the following extracts: A maker of a humidifier for household furnaces states "Evaporating pan and float chamber made in one piece of the best grade gray cast iron—durable and lasting—built to clean and service easily without removing from furnace." A manufacturer of a gas-fired forced air heater for homes says, "Room air that is thoroughly heated on passing over hot cast aluminum radiating elements is forced out of this grill into the room at a level where it is most needed for comfort." A firm making circulating, gas-fired heaters mentions "..... heaters are built of Southern pig iron which offers resistance to deterioration prevalent in damp climates." One of the large manufacturers of cast-iron boilers and radiators placed this sentence in capital letters "The results proved that cast iron although lower in heat conductivity has the high heat emission value which makes it a superior material for radiation."

THOSE manufacturers are capitalizing the fact that cast products are used even where they are concealed from view. Advertising is a point for all foundrymen to consider. While a few points that may be capitalized, have been mentioned previously, the particular application is limited. Nevertheless they form a starting place. Much has been published on the superiority of castings as compared to other types of fabricated materials for definite classes of work, and it should not be difficult to gather such information. It must not be done haphazardly. Every pro-argument for another type of fabrication must be met with a pro-casting statement that will settle the point.

¶ Abandon Oriental Bargaining

A SUCCESSFUL clothing merchant remarking about the changes in merchandizing methods that have occurred since he entered the business as a young man, said that in the early days clothing always was marked, in appropriate symbols of course, with two prices. One price was known as the asking price and the other the rock bottom sales price. The asking price was merely for the beginning of negotiations between the salesman and the purchaser. After considerable skirmishing and jockeying in the manner of Oriental trading practice, both finally agreed on a price and the purchaser walked out with his suit under his arm well pleased with himself and his bargaining powers.

THAT method of bargaining applied not only to clothing but to other commodities as well, and it was an expected procedure. However, in time that practice was eliminated as both merchant and purchaser realized that it was expensive to each. Time was consumed in making the sale which required the merchant to employ more salesmen to supply the needs of a given number of customers. Time was employed which the purchaser could spend to better advantage in other pursuits. It was realized that bargaining was not only an expensive but poor method of doing business, and the practice ceased to the satisfaction of all concerned.

SINCE the one-price method has proved profitable to seller and purchaser in other commodities, why cannot the same practice be applied to castings? The one-price method does not infer that all foundries making the same kind of castings should sell at the same price for that obviously is impossible. It simply means that when a castings bid is made, it will not and cannot be changed because it is the lowest possible price at which a reasonable profit can be made. Such a price is determined through knowledge of manufacturing methods and costs, plus a fair profit. The one-price or firm bidding policy would eliminate distrust, suspicion, and recrimination within the industry and confidence would be restored not only between competitors, but also between seller and purchaser.

Comings and Goings of Foundrymen

Men of the Industry, Whose Activities Are Making Foundry History

A. G. JANES, recently returned from Russia, after spending two and one-half years in that country as foundry engineer, specializing in gray iron, malleable iron and brass shops. Previous to his work in Russia Mr. Janes was connected with the Interstate Foundry Co., Cleveland, Erie Malleable Iron Co., Erie, Pa., Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and the D. J. Ryan Foundry Co., Ecorse, Mich.

D. A. Currie, president, Erie Foundry Co., Erie, Pa., has returned from a month's business trip to France.

Franklin H. Fowler has been elected president of Foote Bros. Gear & Machine Co., Chicago, to succeed **James F. Griswold,** resigned due to other business interests.

J. R. Harris, formerly foundry foreman, Sinclair Engine & Foundry Co., New Orleans, La., has opened a foundry at No. 2 St. Vincent court, 1650 Moss street, New Orleans, and will specialize in gray iron, brass, and aluminum castings.

E. M. Ashcraft Jr., counsel for the company, and **E. A. Russell,** vice president of the Otis Elevator Co., New York, have been elected directors of the Crane Co., Chicago, to fill existing vacancies. Other retiring directors and officers were re-elected.

H. C. Thomas has been appointed assistant to general works manager of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. He is being advanced from the position of director of manufacturing stocks which appointment was received in September, 1929.

C. C. Smith and **J. B. Nordholt,** formerly with the Toledo Steel Casting Co., Toledo, have been made vice presidents and placed on the board of directors of the Industrial Steel Casting Co., Toledo. The entire business of the Toledo Steel Casting Co. has been merged with the Industrial company.

Arthur J. Tuscany, manager of the Gray Iron institute, Cleveland, will address Cincinnati gray iron foundrymen at the Business Men's club, Tuesday afternoon, Feb. 16. This is one of the series of meetings being held in various sections of the country by the institute.

C. F. Biggert has been named vice president in charge of raw material purchases for the International Harvester Co., Chicago, including Wisconsin Steel Co., Chicago, a subsidiary. **W. M. Reay,** vice president, will have charge of purchasing. **A. E. McKinstry** has been elected first vice president of the International company, a post vacant for two years. **George A. Ranney,** vice president and treasurer, has been made vice president in charge of sales. **Sydney G. McAllister** has been appointed vice president in charge of manufacturing to succeed Cyrus McCormick Jr., resigned.

Lest You Forget

YOUR attention again is called to two articles on the origin, history and manufacture of titanium aluminum bronze which will begin in the March 1 issue of THE FOUNDRY. The articles will relate the trials leading to the development of that alloy and will include data on the composition of the degasifying alloy which is an important ingredient in the manufacture of titanium aluminum bronze. While the degasifying alloy has been available for many years, its composition until now, mainly has been a matter of conjecture.

Charles Vickers, the author of these articles, needs little introduction to readers of THE FOUNDRY as he has served as its nonferrous editor for many years, and contributed numerous articles on nonferrous practice.

Watch for these articles starting March 1.

Describes Products

The Aluminum Co. of America, Pittsburgh, recently published a 64-page booklet containing information on its aluminum and aluminum alloys. The first portion of the booklet is devoted to wrought alloys giving data on compositions, annealing practice, heat treatment, etc. The second portion contains information on the various casting alloys the firm manufactures, and the remainder of the booklet contains tables giving data on physical properties of the wrought and casting alloys, and sizes, etc., of wrought products.

Plan Foundry Meeting for Seattle

A sectional meeting of foundrymen in the Northwest will be held in Seattle on March 2 under the auspices of the department of engineering shops, University of Washington, Seattle. Gilbert S. Schaller, associate professor, shop engineering, is in charge of arrangements for the meeting.

The program to be presented at the conference will include a number of important talks on foundry problems including an address by Harry W. Dietert, United States Radiator Corp., Detroit.

Wisconsin Group Hears Discussion of Gates

E. W. Cottrell, formerly in charge of the French plants of the International Harvester Co., presented an interesting description of conditions and operations in that country at the regular meeting of the Wisconsin Gray Iron Foundry group held at the Hotel Schroeder, Milwaukee, on Jan. 13. Mr. Cottrell was introduced by M. A. Blakey of the International company. From the discussion which followed the talk, it was evident that the members of the group are interested in the differences between the practice in France and the United States.

The principal discussion of the evening was devoted to gating. Slides showed the methods of gating recommended in the German book *Lehrgang fur Formerlehrlinge,* which was made available through the courtesy of R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee. Members displayed considerable interest in the recommendations shown by the slides, and pointed to differences in practice.

Prof. Scott Mackay of the University of Wisconsin presided at the meeting. An announcement was made that the department of metallurgy of the University of Wisconsin will not sponsor a foundry conference in February, as has been done during the past several years.

OBITUARY

Alan F. Hilton, 38, metallurgist of the Farrel-Birmingham Co. Inc., Ansonia, Conn., died in the New Haven hospital Jan. 23, after an illness of two weeks. He was born in Cleveland and worked for a period in the steel mills of that city after he graduated from high school. Later he entered the graduate school of Harvard university where he studied under Dr. Albert Sauveur and other noted instructors. He joined the Farrel-Birmingham Co. Inc. June 18, 1923. He was a member of the American Institute of Mining and Metallurgical Engineers and a member of that organization's committee on gray iron foundries. He was a member of the New Haven, Conn., branch of the American Society for Steel Treating, the American Society for Testing Materials and the American Foundrymen's association. He was on the program committee of the A. S. S. T., on committee A-3 with the A. S. T. M., and on the gray iron castings committee of the A. F. A.

William V. Kelley, chairman of the board of the Miehle Printing Press & Mfg. Co., Chicago, died at Chicago, Jan. 20. He was organizer of the Simplex Railway Appliance Co., Chicago, and at one time was president of the American Steel Foundries, Chicago, which had absorbed the Simplex company.

John F. Kyes, 76, founder of the Reed Foundry, Worcester, Mass., died Jan. 25. He organized the foundry in 1901 and was treasurer and general manager until 1912, when he retired. At that time the foundry was absorbed together with the machine tool business of F. E. Reed Co. into the present Reed-Prentice Corp., Worcester.

Andrew J. Stacey, vice president and director, Stacey Bros. Gas Construction Co., a subsidiary of the International Stacey Corp., Columbus, O., died Jan. 18 at his home in Wyoming, O., a suburb of Cincinnati at the age of 73 years. Mr. Stacey was recognized as an authority on machinery and gasholders used in the manufacture and distribution of manufactured and natural gases.

Gottfrid Johnson, foundry superintendent, Busch-Sulzer Bros.—Diesel Engine Co., St. Louis, for the past six years, died Jan. 15. Mr. Johnson was born in Sweden in 1884 and at the age of 15 came to this country. Previous to his association with the Busch-Sulzer company he served as foundry foreman with the Francis & Nygren Foundry Co., Chicago; Russell Co., Massillon, O., and the Miller Improved Gas Engine Co., Springfield, O.

Emerson K. Lewis, 57, formerly vice president of the Lewis Foundry & Machine Co., Groveton, Pa., which was founded by his father the late John L. Lewis, died at his home in Coraopolis, Pa., Jan. 25. For the past ten years he had been associated with the Duquesne Steel Foundry Co., Pittsburgh in its roll sales department. He was regarded as an authority on chilled iron rolls, to which he had devoted long and intense study. He was born, and spent his entire life, in Pittsburgh.

James F. Walsh died at his home in Oak Park, Ill. at the age of 47 years. Mr. Walsh was manager of the Elkhart, Ind. plant of the Chicago Hardware Co., North Chicago, Ill., and representative of the Moline Iron Works, Moline, Ill., in the Chicago district. He also was a director of the Moline company. In his earlier years Mr. Walsh was metallurgist for the Western Foundry Co., and then became the presentative of several foundries. He joined the Chicago Hardware company in 1917 and was associated with the Moline company for 10 years.

Alan F. Hilton

Demonstrates Furnace

Approximately 60 interested steel men were present during the 3-day demonstration arranged by the Bosshardt Steel Corp., Canton, O., Jan. 20, 21 and 22 to show the operation of its 3-ton melting furnace. The furnace is of special construction in that the gas producers are built integrally with the furnace on either side. The furnace will be in daily operation from now on for inspection by those interested. L. J. Harley Jr., is president of the Bosshardt Steel Corp.

Develops Mold Dressing

M. E. Wallace Co. Inc., Sunbury, Pa., has developed a new line of foundry plumbago and mold dressing material. The company has been making a specialized line of facings and blackings for a number of years, especially for cast iron pipe and car wheel foundries.

Marshall Houskeeper, Wayne, Pa., recently was made secretary and director of the company. Mr. Houskeeper has been associated with the foundry industry for over 25 years and recently was connected with Charles Pettinos, New York. For the past two years he has conducted his own business as a producer of foundry sands and will continue that activity in addition to his connection with the Wallace company.

Wilcox-Rich Acquires Holley Carburetor

Eaton-Erb Foundry Co., Vassar, Mich., formerly the Erb-Joyce Foundry Co., now a subsidiary of the Wilcox-Rich Corp., Detroit, a division of the Eaton Axle & Spring Co., Cleveland, has purchased the assets and business of the Holley Permanent Mold Machine Inc., Detroit, and also the gray iron casting business and equipment of the foundry division of the Holley Carburetor Co., Detroit.

By the terms of the purchase, the Eaton-Erb Foundry Co. acquires the patents, patent rights, licenses, trade mark and trade names of Holley Permanent Mold Machine Inc. and now becomes one of the larger gray iron foundries in the country, equipped to handle a wide range of gray iron castings by permanent or sand mold methods. All foundry and machine equipment purchased will be transferred to Vassar, but sales offices will be maintained at the Wilcox-Rich general offices, 9771 French road, Detroit. The manufacture and sale of permanent mold machines will be continued by the purchasers.

Fred Erb continues as president of the Eaton-Erb Foundry Co., with J. L. Dostal, formerly general manager in charge of the sale of foundry service and permanent mold machine equipment of Holley Permanent Mold Machine Inc., as vice president. Other officers include F. A. Buchda, treasurer, and J. H. Bernard, secretary. The board of directors is made up of J. O. Eaton, C. W. Miller, Fred Erb, J. L. Dostal and R. H. Daisley.

Is Appointed Manager

W. J. Reeder has been appointed manager of the St. Louis branch office of the Bailey Meter Co., Cleveland. For the past seven years Mr. Reeder has been connected with the Chicago branch of that company. Headquarters for the St. Louis office will be at 457 North Kingshighway.

The Cleveland office of the Independent Pneumatic Tool Co. has been moved from the Union Trust building to 1740 East Twelfth street. Hayden F. White is manager.

Announce Nominations for A. F. A. Officers

A nominating committee of the American Foundrymen's association recently met in Cleveland and nominated the following members, for officers and directors: For president to serve one year, T. S. Hammond, president, Whiting Corp., Harvey, Ill.; for vice president to serve one year, Frank J. Lanahan, president, Fort Pitt Malleable Iron Co., Pittsburgh; for directors to serve three-year terms each, E. H. Ballard, general foundry and pattern shop superintendent, General Electric Co., West Lynn, Mass., H. Bornstein, director, testing and research laboratories, Deere & Co., Moline, Ill., S. B. Cuthbert, superintendent of foundries, Edgar Thomson Works, Carnegie Steel Co., Braddock, Pa., David Evans, president, Chicago Steel Foundry Co., Chicago, and Franklin G. Smith, president, Osborn Mfg. Co., Cleveland.

The nominating committee was composed of Past Presidents, S. T. Johnston and N. K. B. Patch, and the following members elected by letter ballot: M. A. Blakey, foundry engineer, International Harvester Co., Milwaukee, H. F. Seifert, superintendent brass, foundry and copper department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Frank A. Sherman, vice president, Dominion Foundry Co. Ltd., Hamilton, Ont., and Ralph H. West, president, West Steel Casting Co., Cleveland.

If no other nominations are received, as provided in the by-laws of the association, the candidates nominated by the nominating committee will be declared elected at the annual meeting of the organization in Philadelphia, May 2-6.

Appoints Committees for Gray Iron Institute

Committees for the Gray Iron institute have been named by President A. E. Hageboeck and members of the executive committee, according to an announcement by Arthur J. Tuscany, institute manager. Fifty-two foundrymen have been named on seven committees as follows:

COST—Chairman, J. L. Carter, Sacks-Barlow Foundries Inc., Newark, N. J.; William J. Grede, Liberty Foundry Inc., Wauwatosa, Wis.; P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.; J. Rowbottom, Diversey Foundry Co., Chicago; Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass.

FINANCE AND BUDGET—Chairman, H. C. Chafee, Builders Iron Foundry, Providence, R. I.; J. E. Gilson, J. E. Gilson Co., Port Washington, Wis.; R. D. Phelps, Francis & Nygren Foundry Co., Chicago; J. B. Sessions, Sessions Foundry Co., Bristol, Conn.; R. W. Trump, Columbia Iron Foundry, Philadelphia.

INSURANCE—Chairman, William J. Grede, Liberty Foundry Inc., Wauwatosa, Wis.; H. S. Chafee, Builders Iron Foundry, Providence, R. I.; Fred Erb, Erb-Joyce Foundry Co., Detroit; F. L. Squires, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; and B. J. Voll, Sibley Machine Co.; South Bend, Ind.

MEMBERSHIP—Chairman, R. J. Redmond, Buckeye Foundry Co., Cincinnati; M. W. Baker, Illinois Foundry Co., Springfield, Ill.; G. W. Blakesley, Security Stove & Mfg. Co., Kansas City, Mo.; C. M. Bolich, Nickel Plate Foundry Co., Cleveland; C. M. Clover, Clover Foundry Co., Muskegon, Mich.; H. A. Davis, Fremont Casting Co., Worcester, Mass.; R. E. Dillon, Lake Engineering Corp., Buffalo; H. V. Evans, George H. Lincoln Co., Boston; R. A. Garner, Mutual Foundry & Machine Co., Atlanta, Ga.; E. L. Graham, Acme Foundry & Machine Co., Coffeyville, Kans.; Charles Hoehn, Enterprise Foundry Co., San Francisco; H. P. Hubbell, Semi Steel Casting Co., St. Louis; A. W. Lemme, Elizabeth Street Foundry Co.; Chicago; W. J. Michel, Tarrant Foundry Co., Chicago; Charles Parker, Charles Parker Co., Meriden, Conn.; A. N. Petersen, Brooklyn Foundry Co., Astoria, N. Y.; J. F. Quest, Jeffery-Quest Foundry Co., Minneapolis; J. J. Schmidt, Frederick Iron & Steel Co., Frederick, Md.; George Stanton, Syracuse Foundry Inc., Syracuse, N. Y.; and E. L. Wieland, Milwaukee Gray Iron Foundry Co., Milwaukee.

MERCHANDISING—Chairman, C. B. Magrath, North Western Foundry Co., Chicago; W. M. Bering Jr., Chambers, Bering, Quinlan Co., Decatur, Ill.; John Diedrich, Blackhawk Foundry & Machine Co., Davenport, Iowa; B. O. Fink, Auburn Foundry Co., Auburn, Ind.; Don McDaniel, Hamilton Foundry & Machine Co., Hamilton, O.; and John Pohlmann, J. W. Pohlmann Foundry Co., Buffalo.

TRADE INFORMATION—Chairman, B. G. Parker, Youngstown Foundry & Machine Co., Youngstown, O.; T. J. Frank, Frank Foundries Corp., Moline, Ill.; C. S. Neuman, Union Mfg. Co., New Britain, Conn.; Chester Peebles, Stedman's Foundry & Machine Works, Aurora, Ind., and A. N. Petersen, Brooklyn Foundry Co., Astoria, N. Y.

TECHNICAL—Chairman, H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y.; H. Bornstein, Deere & Co., Moline, Ill.; J. H. Bruce, Bowler Foundry Co., Cleveland; J. D. Coltman, Bullard Machine Tool Co., Bridgeport, Conn.; J. B. Greenstreet, Olney Foundry Co., Philadelphia, and B. H. Johnson, Florence Pipe Foundry & Machine Co., Florence, N. J.

Combined deliveries of brass and bronze ingots and billets by members of the Nonferrous Ingot Metal institute in December totaled 2752 tons.

Plan Cincinnati Meeting for Ohio Founders

Plans are being completed by the Ohio Foundries association for the first sectional meeting in 1932 to be held at the Hotel Gibson, Cincinnati, Feb. 25. A. H. Kramer, Advance Foundry Co., Dayton, O., president of the association and Robert Hoierman, Cleveland, secretary, are outlining the program. The meeting will begin with a noon luncheon.

Safety in foundries, which has been the subject of recent sectional meetings, and the association's annual meeting at Columbus last November, will probably be the main topic at the Cincinnati gathering.

Entering the fourth month of its state wide safety campaign, the Ohio Foundries association is gathering considerable information on the accident rate in Ohio foundries as basis for a plea for a lower state insurance rate later in the year.

Malleable Club Studies Group Estimates

A discussion of estimates featured the regular monthly meeting of the Malleable club, which was held at the Hotel Blatz, Milwaukee, Jan. 12, with Prof. Scott Mackay of the University of Wisconsin presiding. The entire meeting was given over to the study of estimates which had been made by each member company on the basis of a blueprint furnished by the Federal Malleable Co., Milwaukee. The results of the estimates were compiled by the secretary and distributed at the meeting. Discussion was so helpful and interesting that it was voted to conduct a similar discussion at the February meeting, based on a blueprint to be furnished by the Walker Mfg. Co., Racine, Wis.

Tom Croal, Krause Milling Co., Milwaukee, was introduced as a guest and spoke briefly of conditions as he found them on a recent western trip.

Gives Early History

"Pig Iron Rough Notes," a publication of the Sloss Sheffield Steel & Iron Co., Birmingham, Ala., in celebrating the fiftieth anniversary of the firm, contains an interesting account of the founding of the company by Col. J. W. Sloss in 1882, and its development to the present time. Illustrations depicting the old and new methods, and some of the castings made from pig iron manufactured by the Sloss Sheffield company are included.

The Saw & Knife Specialty Co. Inc., 1375 E. 33rd street, Cleveland, has been appointed sales representative in the Cleveland territory for the hacksaw blades of the L. S. Starrett Co., Athol, Mass.

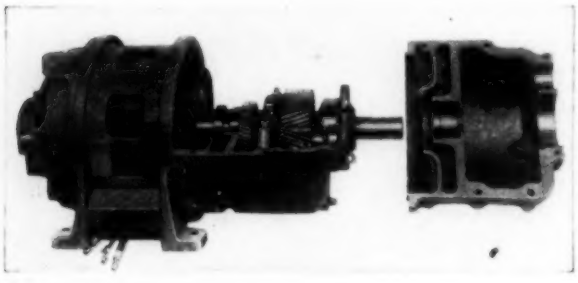
Motor and Speed Reducer Built as Unit

A simple, compact and efficient arrangement for powering various types of motor-driven equipment which operate at reduced motor speeds is provided by new unit drives recently developed by the Westinghouse Electric & Mfg. Co., Nuttall works, Pittsburgh. These new drives, which are known as gearmotors, consist of speed reducers combined with motors forming self-contained units only a few inches longer over all than motors alone. Prominent advantages claimed for this combination of power and speed reducing equipment include economy in space requirements, easy and simplified installation, reduced number of drive parts, high efficiency of operation, and low maintenance requirements.

Each unit includes a general purpose induction motor and a double reduction, nonplanetary type, helical gear speed reducer built to the one-piece motor frame. A feature in motor construction incorporated in these unit drives is the prewound primary core which is separable from the stator frame.

The simple speed-reducing mechanism is enclosed fully in a two-piece housing which is bolted rigidly to the motor frame. The desired reduction of motor speed is obtained smoothly and quietly by helical gears and pinions. All gear and pinion shafts are supported on roller bearings. By a simple splash system of lubrication, all moving parts of the speed reducing mechanism and one motor bearing receive a supply of oil continuously during operation. The lower section of the housing forms a reservoir for the lubricant. The other motor bearing is packed with grease. Seals on all shafts prevent oil escaping into the motor windings and to the outside of the unit at shaft apertures.

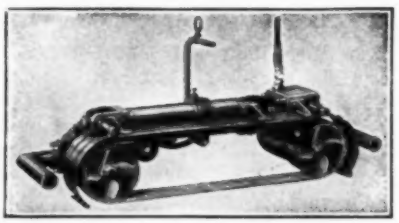
Ventilating air for the motor is taken in through an opening in the lower section of speed reducer housing and properly directed by a curved shield integral with the interior of the housing. Accessibility to parts is obtained by removing the top section of the housing. This can be done without removing the drive from its mounting or uncoupling it from the driven equipment. The units are built in sizes of ½ to 15 horsepower with a wide selection of output ranging from 69 to 1550 revolutions per minute.



The Motor and Reducer Unit with Top Section of Housing Removed

Continuous Belt Sander Has Two Motors

Chicago Pneumatic Tool Co., 6 East 44th street, New York, has developed a new portable, continuous belt sander designed for grinding and polishing straight and curved surfaces of wood, metal and stone. A flexible endless belt carries an abrasive or polishing medium on its outer surface, the belt being driven by two motors, one at each end. The motors are held apart and the belt tension maintained by a telescopic, cylindrical structure actuated by compressed air. This is simple in design and is said to respond instantly when the belt is to be removed or tightened. The motors have a low slip or drop in speed under load, so that high cutting speed of the abrasive belt is maintained under varying loads or belt pressure.



Compressed Air Provides Tension on the Belt

The motor ball bearings are the only parts of the entire mechanism requiring lubrication. These are mounted inside of the totally enclosed motors and are protected to prevent grease or oil from getting out to the work or emery or foreign matter from getting into the ball bearings. One switch, conveniently mounted on one of the motor housings, controls both motors simultaneously. Handles at the end of a suspension bail pivoted at the center of gravity of the machine, provide means for operating in any position. The loaded belt speed is 6700 feet per minute.

The Disk Is Slightly Larger Than the Lining

Valve Body and Disk Are Cast Iron

Freyn Engineering Co., 310 South Michigan avenue, Chicago, recently announced a new valve consisting of a cast iron body lined with Linatex, and a cast iron butterfly disk carried on a steel shaft. The valve disk is made slightly larger than the lining so that when the valve is closed the disk compresses the lining and forms a pressure-tight closure. Resiliency and resistance to abrasion and chemical action are claimed for the valve lining which is manufactured from rubber latex.

Because this type of valve has a nonclogging, self-cleaning seating surface it may be used with dirty water, dirty gas or pulverized fuel. Opening or closing action of the valve is quick and a minimum effort is required to operate it. The accompanying illustration shows the construction of the unit.

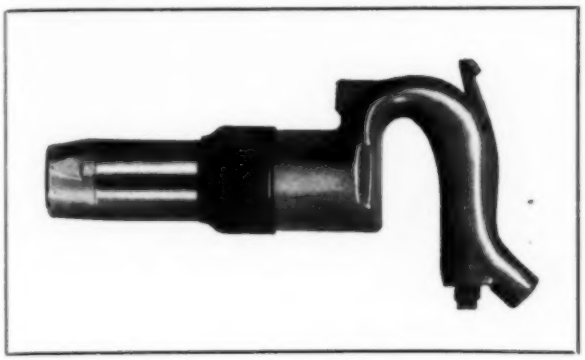
Develops Core Binder

The General Electric Co., Schenectady, N. Y., has developed an alkyd resin type of synthetic resion for application as a core binder. It is an amber colored solution, and it is claimed that it possesses to an unusual degree all the qualifications necessary for a core binder. Cores bonded with the material may be baked in at least 25 per cent shorter time. The cores are said to give off little gas during the pouring operations, and that the gas which is given off is not obnoxious. The binder vaporizes under high temperature, and leaves the core as a soft dry mass which can be poured from the casting. Cores bonded with the synthetic resin binder are claimed to have high mechanical strength, high permeability and smooth surface.

The car service division of the American Railway association reports that 37,272,371 cars were loaded with revenue freight in 1931. This represents a reduction of 8,605,603 cars.

Chipping Hammer Has One Moving Part

The Buckeye Portable Tool Co., Dayton, O., has developed a new line of high speed chipping and riveting hammers. A view of one of the chipping hammers, having a 1⅛ x 1½-inch stroke is shown in the accompanying illustration.



The Piston Operates as Both Valve and Piston at the Same Time

A feature claimed for this new tool is the use of the one diameter piston, that being the only moving part. The piston operates as both valve and piston at the same time, thus preventing that mechanism from getting out of time. It is claimed that the chipping hammer has extreme ease of control and that it will throttle down for light blows without jumping or stopping. The unit has three major parts namely, the handle, cylinder and the piston.

Builds New Compressors

The Sullivan Machinery Co., Chicago, has added new models and additional capacity ranges to its line of vertical, single acting compressors. Belt driven, "V" belt driven and direct motor driven compressors, providing displacement ranges from 27 to 87 cubic feet per minute, are single cylinder, single acting units, distinguished by the use of heavy duty ball bearings for mounting on the crank shaft and also by compactness, simplicity and substantial construction. The cylinder is cast separate from the frame and the head, containing the inlet and discharge valves, may be attached in any one of four horizontal positions, to secure convenience in piping connections.

Direct connected units employ flexible external and internal gear couplings between the compressor flywheel and the motor shaft. The compressors may be equipped with manual, semiautomatic or fully automatic start and stop control for both the belt and direct connected units. The various compressors are designed for air working pressures up to 125 pounds per square inch.

The company also is supplying belt driven vertical units available in two-cylinder and four-cylinder models, which are similar to direct connected two-cylinder and four-cylinder units already on the market. These units may be driven by "V" belts from any desirable form of power unit, and in such cases are mounted on a sub-base which supports the compressor, motor and V belt drive. Capacities range from 119 to 348 cubic feet free air per minute. The four-cylinder units are V type balanced design. the two pairs of cylinders being set at an angle of 90 degrees with a common crankshaft.

Bill Notes Changes

(*Concluded from Page* 35)

helper makes the cores at odd times between his other duties of placing molds on the pouring stands, shifting weights, shaking out the castings from the sand, taking the castings to the cleaning room, and cutting over the sand.

"The lower part of the corebox is solid and contains a facsimile of the lower part of the trolley wheel pattern. The upper part, corresponding to the upper part of the wheel is loose and is fitted to the lower part in the center by a male and female joint at the parting line. A light metal ring, conforming on the outside to the shape of the tapered core print on the pattern, is employed for carrying the core. A shelf on the bottom of the ring is slightly tapered for ease of setting and removal and to insure a tight fit in the core print of the mold.

"With the top half of the corebox and the lifting ring in place, the operator packs sand by hand in the open space until it is filled. The surplus is scraped off and then the top half of the corebox is removed. With this part out of the way there is nothing to prevent the operator from catching the ring with his fingers at two opposite points and lifting it out of the box with the sand core or ring, as an integral part without the least bit of difficulty."

Finish Aluminum with Wire Brush

The wire brush finish for architectural aluminum castings generally is applied after a fine or medium sandblast, according to a recent bulletin, "Specifications for Architectural Finishes Applied to Aluminum Alloy Sand Castings," published by the Aluminum Co. of America, Pittsburgh. The fine sandblast is preferred, but in cases where the surface is exceptionally rough, it may be necessary to use the medium sand.

A wire brush finish is applied by rotary wire brushes with various sizes of wires, depending upon the finish desired. Six to 10-inch diameter wire wheels are recommended, using nickel, stainless steel or German silver wires 0.006 to 0.014-inch in diameter. The speed of the wheel is important, the best results being obtained at 450 to 600 revolutions per minute. The wires in the wheel must be cleaned frequently with pumice stone or a soft brick to insure continued uniformity. The wheel should be reversed on the driving shaft from time to time to keep the wires sharp.

Gray Iron Output Up

Increased activity in the production of gray iron castings is reported by the Gray Iron Institute, Cleveland. Past records show that gray iron production reached its lowest point of the year in December, but in 1931, November was the low point with production and new business showing improvements in the December trade report.

While production increased only slightly from 37.1 to 37.6 per cent of normal, new business gained more than 4 per cent from 26.5 to 30.7 per cent. Unfilled orders declined slightly from 23.1 to 22.6 per cent.

The greatest improvement in production was in the New England and Canadian area which increased more than 5 per cent from 38.2 to 43.7. The Wisconsin-Illinois area was second with an improvement of 4.8 per cent from 31.3 to 36.1 while the Chicago district registered a 3 per cent improvement from 40.3 to 43.3. The Ohio, Pennsylvania, Michigan and Indiana district was the only one reporting decreased activity, dropping from 38.9 per cent in November to 34.1 per cent in December.

Book Review

Applied Personnel Administration, by J. E. Walters, cloth, 338 pages, 6 x 9 inches, published by John Wiley & Sons, Inc., New York, and supplied by THE FOUNDRY, Cleve-

land, for $3.00 plus 15 cents postage and in London by the Penton Publishing Co., Ltd., 416-17 Caxton House, Westminster.

Personnel administration is considered by the author simply as human engineering; the considerations which may be undertaken to provide an understandable method of handling human beings. Personnel administration is justified chiefly because it increases production through improved human efficiency.

The volume has been prepared for use both as a text book for students undertaking a course in personnel administration and also as a general reference for industrial and business concerns. The author, who is director of personnel in the school of engineering, Purdue university and president, American College Personnel association, anticipates that the work will be helpful to present and future business and industrial leaders and workers in solving personnel problems.

Briefly, the work is divided into seven sections, dealing at length with the following factors affecting problems of personnel: Introduction and history, employment, personnel maintenance, industrial training and education, industrial health, safety and employe service. The work is based on information collected in connection with personnel work at the university, upon inspections of personnel departments of a large number of industrial concerns, and upon interviews with many individuals engaged in that work.

What the Foundries Are Doing

Reflecting the Activities of Gray Iron, Malleable, Steel and Brass Shops

Odin Stove Mfg. Co. and Erie Enameling Co., both of Erie, Pa., have resumed on full time.

Rufus Lowrance, 1125 West Eleventh street, Pueblo, Colo., is planning erection of a foundry on West Fourth street, for which he has asked permission from the zoning board.

U. S. Foundry Co. Ltd., Los Angeles, has moved into its new and larger quarters at 6623 Stanford avenue. The company specializes in the manufacture of soil pipe and fittings.

Phillips-Buttorff Mfg. Co., 1401 Hamilton street, Nashville, Tenn., is building a 3-story addition to its enameling plant to give 50 per cent increase in capacity for production of gas ranges and heating appliances. Cost about $25,000.

J. R. Harris Foundry, No. 2 St. Vincent court, 1650 Moss street, New Orleans, La., has been organized to produce jobbing castings in gray iron, brass and aluminum. J. R. Harris is proprietor.

Fairmont Foundry & Mfg. Co., Fairmont, W. Va., recently has been organized to take over and continue the activities of the East Side Mould & Foundry Co. The company will specialize in jobbing and casting of gray iron, brass, copper and aluminum. L. J. Carskaden is president of the company.

The Ladel Truck & Foundry Co., New Philadelphia, O., has been reorganized and the name changed to the Ladel Conveyor & Mfg. Co. J. S. Morrison, formerly of the Mining Supply Co., Pittsburgh, will be associated with the company. Output will include conveyor machinery such as is used in coal and clay mines in addition to other lines built by the company. Ivor Harris is president of the newly organized company, N. W. Judkins, vice president, and A. L. Schwab, secretary-treasurer.

RAW MATERIAL PRICES

Feb. 4, 1932

Iron	
No. 2, foundry, Valley	$15.50 to 16.00
No. 2 Southern, Birmingham	12.00
No. 2 foundry, Chicago	16.50
No. 2 foundry, Buffalo	16.00
Basic, Valley	15.00
Basic, Buffalo	15.50 to 16.00
Malleable, Chicago	16.50
Malleable, Buffalo	16.50
Coke	
Connellsville Beehive coke	$3.25 to 4.50
Wise county beehive coke	4.25 to 5.00
Detroit by-product coke	8.00
Scrap	
Heavy melting steel, Valley	$9.50 to 10.00
Heavy melting steel, Pitts.	10.00 to 10.50
Heavy melting steel, Chicago	7.00 to 7.50
Stove plate, Buffalo	8.50 to 8.75
Stove plate, Chicago	5.25 to 6.25
No. 1 cast, New York	6.50 to 7.00
No. 1 cast, Chicago	8.00 to 8.50
No. 1 cast, Philadelphia	10.50 to 11.50
No. 1 cast, Pittsburgh	10.00 to 10.50
No. 1 cast, Birmingham	9.00 to 10.00
Car wheels, iron, Pittsburgh	10.00 to 10.50
Car wheels, iron, Chicago	7.00 to 7.50
Railroad malleable, Chicago	7.00 to 7.50
Agricltural mal., Chicago	6.50 to 7.00
Malleable, Buffalo	9.50 to 10.00
Nonferrous Metals	
	Cents per pound
Casting copper, refinery	6.25 to 6.50
Straits tin	22.00
Aluminum, No. 12, producers	22.00
Aluminum, No. 12 remelt	8.50 to 9.50
Lead, New York	3.75
Antimony, New York	6.75 to 6.90
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	3.80

Trade Publications

DUST COLLECTING — Descriptions and illustrations of a system of collecting dust are included in two publications recently issued by The Allington & Curtis Mfg. Co., Saginaw, Mich.

BRONZE ALLOYS—The Barry Bronze Bearing Co., 7th and Bulson streets, Camden, N. J., has prepared a bulletin listing the various types of alloys which it manufactures and indicating the advantages of each.

MAGNETIC SWITCH—General Electric Co., Schenectady, N. Y., has published its bulletin No. 841B illustrating and describing across-the-line starter for induction motors. Accessories used with this switch also are discussed.

FURNACES—Bulletin No. 320 by the W. S. Rockwell Co., 50 Church street, New York, is devoted to applications of its electric and fuel furnaces for ferrous and nonferrous metals, ceramic and chemical products. A list of various types is given, with their uses described

DIE CASTING—Interesting facts on the physical properties of alloys and die castings are included in a folder recently issued by the Allied Die-Casting Corp., 43rd avenue from 38th to 39th streets, Long Island City, N. Y.

BUCKETS—Cleveland Electric Tramrail division, Cleveland Crane & Engineering Co., Wickliffe, O., has published a folder entitled "Buckets Must Be Used." Photographs illustrate various uses of buckets in industry, including applications to the foundry.

VALVES—The Haydenville Co., Haydenville, Mass., has illustrated and described its lubricated air cocks in a recent bulletin. This cock has an oil pocket in the spindle with outlets so located that each time the unit is operated, enough lubricant is passed to the two oil grooves to prevent freezing or sticking.

ALUMINUM PAINT—An interesting folder discussing the application of an aluminum paint in the protection of wood, metal, fabric, stone and other materials has been prepared by the Aluminum Industries Inc., Cincinnati.

THERMOSTATIC RADIATOR VALVE—Powers Regulator Co., 2720 Greenview avenue, Chicago, is distributing its bulletin No. 260 describing an automatic control of direct, indirect and concealed radiation. The unit consists of a self-operating regulator designed for vacuum or vapor steam heating systems.

PORTABLE SANDER—Chicago Pneumatic Tool Co., 6 East 44th street, New York, has prepared a bulletin describing a new portable, continuous belt sander which recently has been developed by that company. Specifications and features of the new sander are included and illustrations show the main features of design. A safety balancer for suspending, balancing and lifting portable tools or objects weighing from 10 to 150 pounds also is described.

BUILDINGS — 101 questions that should be answered before building any type of industrial plant are presented in a recent folder published by The Austin Co., Cleveland. The publication points out that engineers of that company are prepared to assist in the solution not only of the questions listed but many others which may arise in constructing any building from a single small warehouse to a complete industrial plant.